RAILROAD GAZETTE

FRIDAY, AUGUST 23.

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Contributions.

Burnt Clay Ballast in India.

EAST INDIA, July 3, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read "Burnt Clay's" letter in your issue of May 17. The description of clay he refers to is not often met with in this part of India; in fact, good brick clay is difficult to obtain, and we are obliged to use stuff that English or American brickmakers would throw aside as useless. The East Indian Railway runs for a considerable distance through the Ganges Valley, and there good brick fields are often 100 miles apart. In hilly parts of the country matters are still worse.

Ballast has been burnt by simply shoveling a layer of clay, dry from the pit, on to a layer of rubble coal, then adding another layer of coal, and so on, but the results were very poor. Even when the clay has been vitrified it did not last; perhaps one reason is that all our tamping is done with picks, or as they are called in some parts, tamping hammers. Tamping bars are *never* used. I do not see why burnt clay should be cheaper to handle than stone ballast, and in India it certainly is more dusty and less elastic than stone, no matter how well made, although the first cost is certainly less.

RAILROADER.

The Shape of the Rail Head.

TO THE EDITOR OF THE RAILROAD GAZETTE:

One of the frequent causes of train accidents is the breaking of the spring rail in spring frogs. This rail, in shaping, is cut away greatly, and not being firmly secured to anything solid in the frog, is peculiarly liable to break from unintended causes. And probably the most frequent of these causes is the "false flange" on the locomotive driving wheels. When a cause is known we know at least where to apply a remedy, if we can find one. To my mind Mr. Sandberg is approaching it. In past years I have urged on clients the use of a rail with a head 3 in. or more in width, and in fact my failure to secure any adoption of a 3-in. head has been the only thing that has deterred my urging a head as wide even as 4 in. It is evident that if the head of the rail were as wide as the tread of the wheel no false flange could result, unless the top of the rail were so rounded as to produce a groove corresponding to its shape. It is not worth while to discuss the possibility of so wide a rail, but the shape is an open question. The objections I have met to the use of a head wider than the 2¼ and 2½ inch in use have been due to the increase of weight that would result from so great an increase of head; that does not come, of course, from those requiring a heavy track.

Mr. Sandberg's rail, while a move in the right direction in increasing the width of the head, still leaves a serious defect in the rounded shape of the top, which, between the necessarily round edges to fit the flange fillet, should be flat. It has been the universal practice to give the tread of the wheel a conical shape, but the prompt manner in which the cone, especially of driving-wheels, is worn down to a groove is very conclusive proof of the practical uselessness of the cone shape. A flat top rail of good width will groove a wheel less than any shape that can be made, and while it is easy to conceive the objections that will be made to such a shape, I believe they are less than many valid criticisms that can be urged against a curved top rail.

It hardly seems necessary to make the rail as high as Mr. Sandberg does, even for heavy traffic. It may be desirable for that absurdity, a suspended joint which leaves unsupported the very part of the track that most needs support, but otherwise the extra weight due to any height above 4½ or 5 in. were better saved or put into a wider flange.

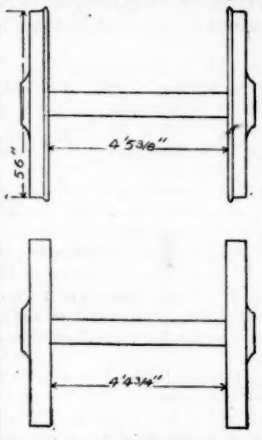
C. J. BATES.

Plain Tires and Guard Rails.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Trackmen complain that they can't keep their guard rails in position, that they are always loose in spite of the extra precaution taken to brace them heavily with several rail braces. Frogs also get loose and are found to move back and forth with each train. No part of the track is so dangerous as at frogs. Hence the necessity of keeping everything in and about a frog in perfect condition. A loose guard rail is an element of danger at all times.

In addition to the ordinary wear of a guard rail and frog they are subject to excessive and dangerous wear from the presence of "blind" or flangless tires, of *extra width*, on locomotives. These plain tires, on account of extra width, are allowed to project *inside* from 1/16 to 3/4 of an inch more than all the other wheels on the road. The M. C. B. standard distance between the backs of all wheels is 4 ft. 5⅝ in., with a slight variation either way. Between the backs of plain tired wheels the distance is often 4 ft. 4¾ in.



While tires, rails and ties are *new*, no harm can come from these plain tires; but when the main rail is worn down 1/16 or 1/8 an inch lower than the guard rail, as fig. 1, or when the main rail cuts into the ties 1/8 an inch, then the mischief begins, fig. 2. Again, when motive power is short or business is rushing, the worn tires of locomotives are not turned off until the last moment, and at such times the plain tire becomes a double-flanged tire and gets in its most dangerous work, fig. 3. This will explain one cause for loose frogs and guard rails on roads with such engines.

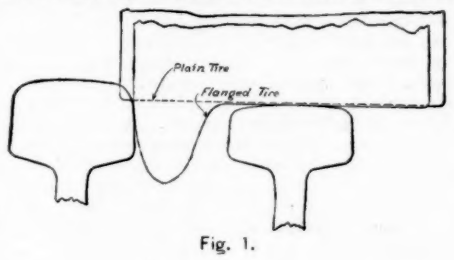


Fig. 1.

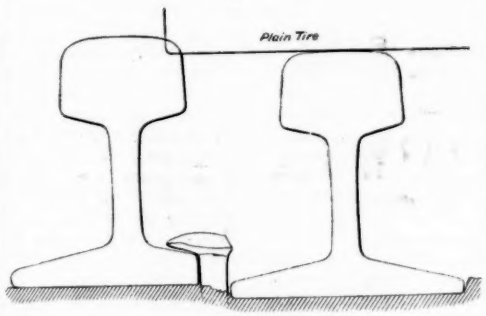


Fig. 2.

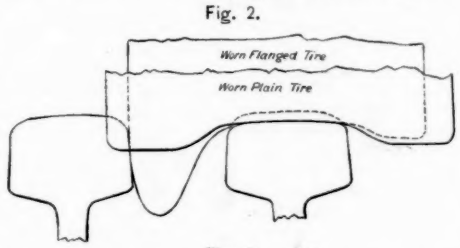


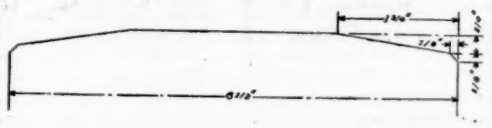
Fig. 3.

There does not seem to be any real necessity for having the backs of these plain tired wheels so near together, for when they are in the condition of fig. 3 we have solid metal 4 ft. 4¾ in. forcing its way through 4 ft. 5 in. solid, being the distance between frog and guard rail. Is it surprising that something does not get loose?

If the proper distance between backs of wheels is correct, viz. 4 ft. 5⅝ in., why should one pair of wheels of an engine among the thousands of wheels in use be made any exception?

A. D. B.

[The standard blind tire of the Schenectady works is here shown. It will be seen that it is coned both outside and inside, symmetrically, to provide against some of the evils which are pointed out above. Further comment on this matter will be found in the editorial columns.—EDITOR RAILROAD GAZETTE.]



The Boynton Bicycle Railway.

NEW YORK, Aug. 20, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is the purpose of these lines to call the attention of the readers of your valuable paper to a new system of railroad now being built at Coney Island. This is simply an experimental line, 1¼ miles long, three-fourths of which is trestle work over swamps, and the remaining is on sandy ground. It starts at Gravesend Station, on the Sea Beach Road, and, following the tracks of the old New York & Brighton Beach it ends at the corner of the Parkway and the Concourse in Coney Island.

The fundamental principle of this system is that of a common bicycle running over a single steel rail and being pushed by steam power instead of by muscular force; but in order to provide for the safety and comfort of travel an upper or guiding 6 × 8 in. wooden rail is used, held in position by a lateral structure firmly secured to the track. So, instead of a 2-rail horizontal track, with gauge of 4 ft. 8½ in., this system uses a lower steel rail, and vertically above it a guiding wooden rail, with a gauge of 15 ft. from the top of the lower to the bottom of the upper rail; between these two rails the locomotive and cars run, resting upon 2-wheeled trucks, the wheels of which are grooved or double flanged, and have, instead of the ordinary wheel axle, bicycle spindles. Directly above each truck and firmly attached to the roof of the car there are two 12-in. horizontal wheels placed one on each side of the upper rail with one-half inch play between wheel and rail, so that it can be said that the train is grooved between the upper and lower rails, and therefore, aided by mechanical contrivances, the train runs smoothly and safely, and it is impossible for it to jump off the track.

The maximum width of the vehicles is 48 in., and the gauge of the ordinary railroad track being 4 ft. 11 in. from centre to centre of rails, two bicycle trains can run in opposite directions, one over each rail, and leave still 11 in. between them. Therefore, by simply erecting the superstructure which holds the upper rail, a single-track railroad is easily converted into a double-track bicycle railroad, without interfering, however, with the running of the present trains during or after the erection of the structure. The design and expense of erecting this superstructure varies with the conditions of construction, but a fair average can be estimated at $8,000 per mile.

The line selected is very favorable for the experiment, for it is mainly composed of a 10 deg. curve on 92 ft. ascending grade, followed by a 6 deg. curve on an 80 ft. descending grade, and a level tangent 1,200 ft. long, ending in a 24 deg. curve; and it is only to be regretted that there is no long tangent over which to try the speed of the new bicycle engine.

I will leave for a later date the description of the details of construction, and also the result of the experiments that will shortly be made over this line, and will now briefly state some of the advantages that the inventor, the Hon. E. M. Boynton, claims for the bicycle system over the double-rail system of railroads. These are:

1. Greater cheapness in almost every item of construction.
2. A great reduction in the first cost and wear of the rolling stock.
3. A greater proportion of the live to the dead load in the same.
4. A greater proportion of the active to the resisting forces of the train motion.

J. R. V.

The Position of Crank Pins.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a paper entitled "Locomotive Balancing," published in your issue of Aug. 9, the writer argues in favor of abolishing the almost universal practice of setting the crank pins at an angle of 90 degrees. While the proposed arrangement of simultaneous piston action could no doubt be used on a locomotive having no coupling-rods, and three or more cylinders imparting their force to two axles, the clearly implied inference that the crank pins on the American type of locomotive could be changed from the customary angle of 90 degrees to 180 degrees, or a position exactly opposite to one another, and the engine be successfully operated, provided it was equipped with some suitable device for starting it off the dead centres, cannot be borne out in facts.

The 90-degree cranks on locomotive engines, apart from their value as a means of starting at any position of the stroke, are necessary, where coupling or parallel rods are used, to keep the driving wheels revolving in exactly the same relation, one with another, at all times. A little investigation will show the reason for this. When the crank pins on one side are on the centre at either end of the stroke one wheel can be turned considerably from its correct position without affecting the length of the coupling rod to any appreciable extent, provided the rod on the opposite side is disconnected. Then if the engine is moved, causing the wheels to revolve simultaneously, it is evident that as the crank pins approach the half stroke the coupling rod has to slip the wheels until they have assumed their original position. This is precisely what would take place if the crank pins were changed to opposite positions on an engine using coupling rods. From various causes the driving wheels as they roll along the rails would not preserve exactly simultaneous and uniform motion, having no restraint imposed upon them at the commencement and completion of the stroke. This uneven action would evidently take place under the many different conditions of adhesion met with in ordinary practice. Therefore, as the wheels revolved toward the half stroke, the coupling rods, being of exactly the same length as the distance between the drivers, would pull them back by slipping the wheels to the normal position. The enormous strains imposed upon the rods and crank pins under these conditions would undoubtedly soon result in one or both breaking.

The argument is made that a disabled locomotive using one cylinder can get along with a train and experience no difficulty in sticking on the dead centre, provided the tractive force necessary to move the train is within the power of one

cylinder. In this case the engine should only be moved, with the wheels coupled, when the accident is confined to breakages on one side ahead of the main wheels, in which case the main rod can be disconnected, the cross-head blocked and both coupling rods left intact. In event of an accident which necessitates the disconnecting of one coupling rod, it is absolutely necessary to remove the rod on the other side before the engine is moved; otherwise, in the attempt to run with one coupling rod, owing to the absence of anything to keep the wheels moving simultaneously, and the pins horizontal at all parts of the stroke, a broken rod or crank pin would in all probability be the result.

Before simultaneous piston action can be used on engines having coupled drivers, some method other than rods must be employed to revolve the back wheels and utilize the weight resting upon them for adhesion; also some satisfactory and economical method of getting the engine off its dead centres invented. Your correspondent says in reference to the question of starting: "How then must the starting difficulty be overcome? Very simply. In textile factories it is not allowed to be a hindrance for a moment, even with simple engines or with side compounds when the high-pressure crank is at the dead point. Stationary engineers are more progressive, for they use a small, quick running engine, geared to a worm and of sufficient power to turn the wheel of the big engine until the crank is at a position to start, when the little engine drops out of gear automatically. Now, there is no possible reason why a similar plan should not be applicable to a locomotive." With due respect to the progressive stationary engineers, I do not think the cases are parallel. It is one thing to start a mill engine, even if very large, over the dead centre once or twice a day, and quite another to keep starting a locomotive under all its varied conditions of service. With the stationary engine, after the crank is turned slightly it proceeds with its uniform revolutions for several hours without further assistance from the auxiliary engine. With the locomotive, however, the case is different. From the time it starts from the round house to couple to the train until it is again at rest in the engine house at the termination of its trip it makes a great number of starts and stops, even in the most favorable case of a through express train. Imagine the inconvenience arising from the use of an independent engine to start off the centre in getting in and out of the engine house, running on the centre of turn-table, coupling on to the train, and many other cases likely to arise in daily service, and the amount of profanity which would be evolved in the operation!

Another very serious objection to the use of opposite cranks is the great inequality of the rotative force exerted on the cranks ranging from zero to the full power of both cylinders at half stroke. In an engine with 90-degree cranks a rotative force ranges from the power of one cylinder at half stroke as a minimum to the power of both cylinders at quarter stroke as a maximum.

In this connection it may be stated, as an explanation of the alleged superiority of adhesion in an electric motor over a locomotive of equal weight, that in all probability it is largely due to the equality and uniform rotative force exerted on the wheels, producing a constant and even tension on the draw-bar, rather than to the more perfect balancing of the revolving parts. C.

The Chemnitz Shops of the Royal Saxony State Railroads.

The mechanical headquarters of the Saxony State railroads are at Chemnitz, and there the principal shops are located. The number of workmen employed is 1,300. The erecting and repair shops have tracks for 60 locomotives and capacity for repairs sufficient to care for 2,000 locomotives and 10,000 cars. Several new locomotives are constantly building and new cars are made as required. At these shops there have been recently constructed several compound locomotives of a new design, and they are now being tested in various classes of service. These locomotives are fitted with a new admission valve which controls the admission of steam to the low-pressure cylinders. It is not an automatic valve, but has many advantages not easily attainable in a self-acting valve. Thus, when the cylinders are used for braking upon hills, the new valve does not close and prevent the action of the high-pressure cylinder as well as the low from assisting in braking the trains. This valve is known as the "Lindner" starting valve and is in use on 30 or more locomotives at the present time. It is a patented valve and was invented by Mr. Robert Lindner, engineer at the Chemnitz shops. During its development extended trials were made of those in use elsewhere. The device is simple and requires no greater degree of intelligence to operate than to pull a sand rod; it is, in fact, operated by the reverse lever without the use of other handles. Between it and the reverse lever there is a positive connection. When the compound locomotives of the new type were put on the road for use, no particular directions were given to the engineers with regard to their manipulation, and it is a fact that the compound on these lines has been reduced, in simplicity of construction and operation, to an every-day machine requiring no more attention from the engineer or the round-house foreman than the simple locomotive. With this type many experiments have been made in starting trains, and with such good success, as shown by the indicator diagrams and the train acceleration, that the officers of the road assert that these engines have more power at starting than others on the same lines, built and used for the same service, but operated in single expansion.

The officer in charge of the Chemnitz shops and the other outlying shops is Herr Richard Klein, a gentleman well versed in all branches of theoretical mechanics and with a large, practical experience, and one finds at the Chemnitz shops, as at other shops in Germany, evidence of scientific work and investigation of a high order, particularly in mechanical construction.

At these shops there is a large truck-wheel lathe of such rigidity that it takes a chip from across the whole tread of the tire and a portion of the flange with one tool. The lathe is run in the opposite direction to the usual custom; that is, the top of the lathe runs from instead of towards the cutting tool. This causes the cutters to be placed "bottom up;" and it is claimed that in this method there is less weight upon the lathe centres, and that the cut of the tool is steadier. The tool on this large machine certainly works without the least clatter. All wheel lathes at this shop run backwards, as just described. When an extra heavy cut is to be taken from a tire a series of grooves are made in it by a tool with narrow cutting blades, after which the tool with a wide face removes the strip of metal and "trues up" the tread.

In the wheel department a novel hammer is employed to place the "Gibson" tire fastening in position. This fastening is that in use on the Arbel wheel now being introduced into the United States, and is the one which has been adopted by the German State railroads. The edge of the groove in the tire has to be hammered down over the retaining ring. To do this a riveting hammer run by a belt, and appearing not unlike the common helve hammer, is arranged to strike the edge of the tire while the wheel is being automatically fed around a central pivot.

An enormous number of wrought-iron wheels is to be seen at these shops. No cast-iron wheels whatsoever are visible. The driving wheels which are used under the newest compound locomotives are made in Belgium at the Cockerill Works by the Arbel process. A peculiar method of marking axles with the date of examination in vogue here is to place a band of metal around the centre of the axle, upon which the dates are stamped, the ends of the band being riveted together. Driving wheels from old locomotives can be seen here having wrought-iron spokes cast into cast-iron hubs.

An ingenious wheel and axle carrier is in use in the car shops. It consists of a long, central backbone, projecting from which are four arms or ribs, two on each side. These arms are hinged to the central backbone, and are placed at the same distance apart longitudinally as the gauge of the rails. In use the carrier is placed crosswise of the track and the arms are allowed to swing down onto the rails, and thus form an inclined plane for truck wheels or the axles to be rolled up onto the carrier. The weight of the wheels then raises the arms and locks them in position. At the centre of the long central backbone is mounted a pair of wide-tread trolleys, and it is upon these that the carrier and its load are transported about the shops in a very simple and handy way, only one man being required to handle a pair of wheels. The cost of this carrier is very small indeed.

In the car shops one notices that the same difficulties exist in Germany with wooden sills as in America. Many of the old cars which were made with wood end sills are being repaired, but in each case the wood is being wholly removed and iron substituted therefor. Inquiry revealed that it costs less to put on an iron end sill than a wooden one. These shops are building an American style car for third-class passenger service, called "Omnibus" cars. The material of all posts, stanchions and carlines is of oak, seasoned four years. The sills are of iron. The joints between the wooden parts are tenoned as usual, and in addition have bracket knees of wrought iron secured to each part by screws. These cars are made very long and mounted upon three pairs of wheels, the third pair being at the centre. In order to pass curves readily the central pair is carried in a frame which has a lateral motion of several inches, and, in addition, the axle boxes have a slight radial freedom in the jaws. One of the end axles is held firmly in position, but the other end axle is turned into alignment with the radius of the curve by a peculiar attachment to the central axle. From one side of the central truck frame a stiff bar connection is made diagonally across the car to the frame of the end truck on the opposite side of the car. Whenever the central truck is displaced laterally the stiff connection pulls or pushes on the corner of the end radial truck frame and causes the frame to rotate in a degree governed somewhat by the amount of the lateral displacement of the central truck. Thus the end radial truck is rotated by the lateral movement of the central truck according to the height of the arc of the track included within the wheel base of the car.

The light in the Chemnitz shops, as in almost all German shops, is obtained through the roof. A section of the roof resembles the teeth of the blade of a "splitting" saw, the inclined side being covered with tiles and the vertical side being supplied with heavy glass plates. The glass side is almost invariably turned towards the north or west. The shop at night is lighted by large Siemens gas lamps, hung to the ceilings about at the usual distance for electric arc lamps.

In the erecting shops a very small, narrow gauge locomotive is being altered to a compound, in order to increase its power. One cylinder had become broken, and this furnished an opportunity to make the desired change. The old cylinder was made high pressure, and a large low-pressure cylinder was added.

The tenders used on the Saxony State railroads have a "water bottom" in the coal space; that is, the bottom of the coal space is formed by a portion of the tank. The top of the tender frame is therefore wholly covered by the tank, and the coal dust does not sift through onto the trucks.

A new boiler shop has been recently added to the plant at Chemnitz. This shop contains a traveling crane, but as all the riveting is done by hand, and all of the rivet holes in boiler sheets are drilled, but little of the modern machinery so necessary in the United States is needed. Some of the boilers in use on this line have the "drop" on the inside lower corners of the fire-box rings exactly like that used on the Chicago, Milwaukee & St. Paul and several other Northwestern roads where the feed water is bad.

One of the stationary boiler plants has a smoke-consuming device. A locomotive boiler and a peculiar type of stationary boiler are arranged so that the gases from one passed through the other. There are many other interesting details about a German railroad shop, but one must see them to appreciate their value. A feature out of the ordinary line, however, is the dinner room. The difference in the dinner rooms at different localities is not material, and a general description of one will answer for all. Imagine a long room whose walls are filled with windows, and which contains rows of natural-wood colored tables and benches of the plainest style, broken at intervals in the absolute regularity by the space left for large stoves, all scrupulously neat and brightly polished; in one corner a real bar, not unlike the American in appearance and attended by a neat barmaid, who deals out the native beverage of the German in exchange for a few pfennigs per litre, each glass being graduated at ½ or 1 litre and regularly inspected by the royal inspector. In an opposite corner is a large porcelain stove with a recessed top partially filled with clean, hot sand, in which are placed the dinner kettles of the workmen to be heated for the midday meal. The care of this department is just as much a part of the duty of the superintendent of the shops as any other portion of works, and here it is that all notices are given out and the men are paid. The paying system is peculiar, and is in charge of three men. One gives to the employés small tin boxes containing the money, with the amount marked in pencil upon the white enameled top prepared for that purpose, while another calls off and checks the numbers. In this manner 1,300 men have been paid in 25 minutes. Seeing so many money boxes and so much hand labor in the shops, one has the curiosity to inquire the amount each earns. While prepared to hear of low rates, it was a little surprising that the pay for machine-shop workmen ranged from 22 to 27 marks per week, equivalent to $5.50 to $6.75 for six days' labor of 10 to 11 hours each. There are many boys working in the shops, who earn little or nothing from an American standpoint.

These men are not dissatisfied. Living is very cheap; neighbors are friends of boyhood, and since early childhood the man has been accustomed to just the same comforts that he now has. Each has his little family and his Sunday excursion to a favorite beer garden, with the best of German music. Each week he manages to lay by a little for old age, and in the even tenor of his way, the freedom from the anxieties of ambition, and in fact in the actual likeness of each day to the one preceding the German workman finds happiness. Naturally he has method and precision, and the three years of compulsory army life engenders a love of regulation, which enables him to enjoy a methodical life, which the nervous American mechanic would think the very essence of "humdrum" monotony.

Visitors at the Chemnitz shops are always welcome, and the hospitality is of the kind that pleases Americans.

D. L. B.

Componential Trusses for Traveling Crane*.

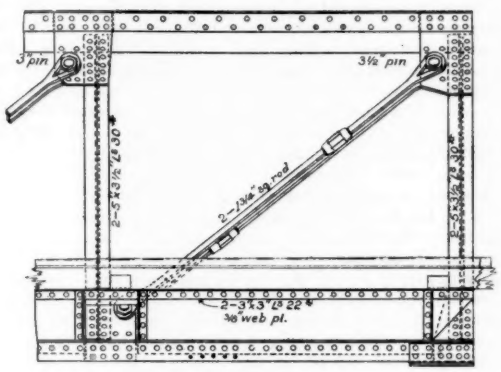
During the past winter there was constructed at the marble yard of Messrs. John Baird & Sons, Philadelphia, an iron trestle, complying with unusual conditions. Since its design possesses some peculiar features of engineering interest, the following description is submitted to the members of the society.

The marble yard mentioned is located on the Schuylkill River, just south of Walnut street, and extends from Twenty-fourth street to the wharf line, a distance of about 320 ft. It has on Twenty-fourth street an extensive saw mill, and the yard space between the mill and the river is used for the storage of blocks of marble. These blocks are conveyed from the river and distributed over the yard, or carried into the mill, as the case may require, by a traveling crane which moves on two elevated rails, one at each side of the yard.

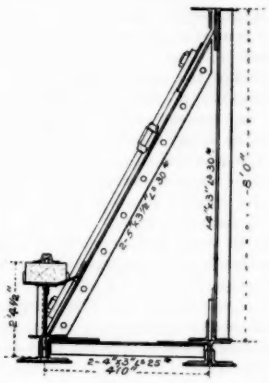
When the Baltimore & Ohio Railroad extended its lines into the city of Philadelphia it crossed Messrs. Baird & Son's property and threatened to seriously injure their business by separating the mill from the yard. The elevation of the grade of the railroad was such as to permit of only 2 ft. 5½ in. for the depth of any overhead structure, while the width of the right of way to be spanned was over 60 ft. At that time shallow box girders were constructed, carrying the stringer and the elevated rail over the right of way, and by this means the traveler was permitted to pass from the yard into the mill.

After the railroad had been in active operation for about two years, however, its yard room adjacent to Chestnut Street Station proved insufficient for its increasing business, and, in order to reach additional tracks south of Walnut street, it was proposed to increase the width of the right of way across the yard to 100 ft., and to support the elevated tracks over the railroad, as before, on iron girders. The maximum allowable depth of 2 ft. 5½ in., with a clear span

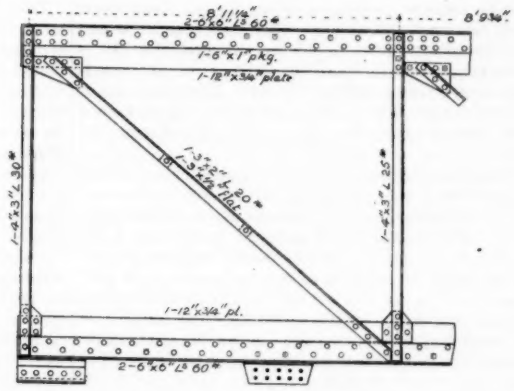
* By Henry B. Seaman, M. Am. Soc. C. E. Read at the Seabright Convention Am. Soc. C. E. In revising this paper for publication in the *Transactions* of the Society, Mr. Seaman has made an analysis of the strains and given additional information. Some of his later notes are incorporated in this article.



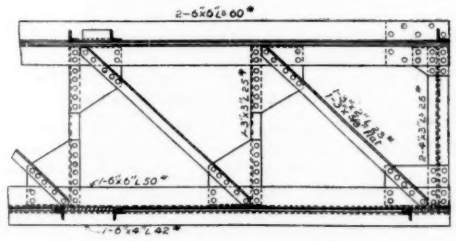
Elevation of Oblique System.



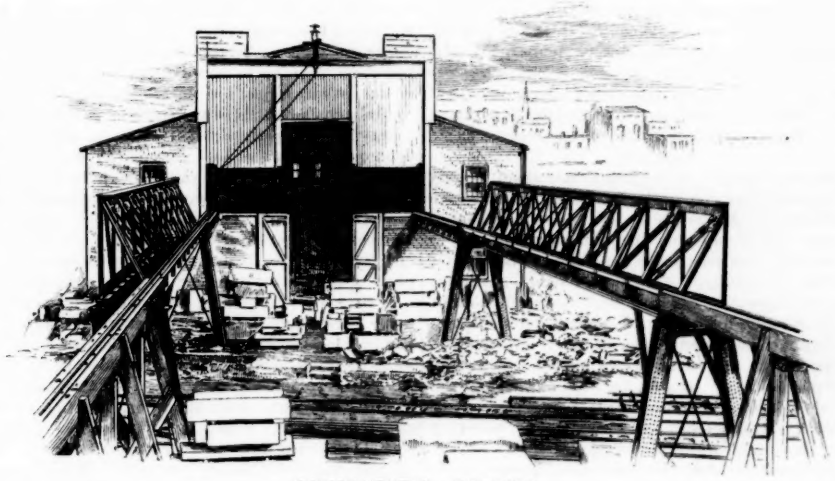
End View.



Elevation of Vertical System.



Plan of Horizontal System.



COMPONENTIAL TRUSSES.

General View and Details of End Panel.

By Mr. HENRY B. SEAMAN, *Mem. Am. Soc. C. E.*

of 100 ft., made the problem a serious one. The shape of the traveler, extending 12 in. beyond the rail, rendered the use of a deep girder, outside of the stringer, objectionable on account of the lateral moment produced. The construction of the mill was such as to prevent the further elevation of the track; and the required clearance beneath, with a proper limit of deflection, made the use of a deck girder, as before, impracticable.

The plan adopted, as promising the most satisfactory results with the greatest economy, was the one herein described.

The general design, as may be seen by the accompanying photograph, was such as to place the supporting girders entirely outside of the stringers, and at the same time to provide for all lateral moments produced in the structure. In detail, the vertical load was resolved into two components—horizontal and oblique—and these components were each carried by a separate web system. The oblique system was of sufficient depth to give vertical stiffness to the truss, and was placed at such an inclination as to avoid the end of the traveler—the horizontal system was so constructed that its outer chord would come directly under that of the oblique system. These componential web systems were united at their apex by a common chord; and their remaining chords, on the outside of the truss, were, in turn, united by a vertical system. Thus was constructed a truss with three chords and three web systems.

The componential systems carry the live and dead loads applied at their apex, while the vertical system carries the dead load applied at its chords. The top and bottom chords of the vertical system act as the chords proper of the truss, while the chord at the apex under the applied loads serves to transfer the strains from one componential system to the other, and at the same time acts as a stringer to carry the live load between panel points.

The action of the forces in the truss is an interesting feature. Owing to the peculiar form of construction, there are at each end of the truss two distinct vertical reactions—one at each supporting column. The reaction of the outside column, under the vertical system, is due entirely to the strains in that system; and since its purpose is merely to retain the two chords in position, the reaction is equal to one-half of the weight of these chords, and is, therefore, a constant quantity. Having obtained the reaction of the outside column, that of the inside column, under the stringer, is found by subtraction—or, since the former is due to the dead load of the two outside chords, the latter is due to the dead load of the stringer chord, and to the live load. In each case the weight of the web systems is assumed as being carried equally by the two adjacent chords. An elementary method of deducing the strains would be to first resolve the applied loads into the two components of the web systems, and then consider each system as a distinct truss. In following this method, the tensile strains, in the stringer chord, from the oblique system, and the compressive strains in the same chord from the horizontal system, would be found to neutralize each other. It must be remembered, however, that the horizontal system can only receive its load at the panel points to which the oblique system is attached.

The stringer has been termed a "chord," but in reality it is a portion of the web system, and, like the other members of that system, receives the heaviest strains in the panels nearest the supporting columns. This will be readily comprehended when it is understood that the direct strain in any panel of the stringer "chord" is due to the diagonals of the same panel, and is equal to their longitudinal component.

The horizontal and vertical systems are made of riveted lattice, since they require no adjustment, and their construction of riveted work was considered economical. The horizontal system is provided with counter diagonals in each panel, and was designed to resist all counter strains produced in it by the live load; the vertical system, however, which carried only dead load, does not provide for counter-strains, and each panel is therefore constructed with but a single diagonal.

The diagonals of the oblique system are square rods with sleeve nuts, which permit the proper adjustment for camber and rigidity. By this arrangement it is practicable to carry the live load strains through the componential systems, as designed, and allow the vertical system to carry only dead load. The proper adjustment of the rods in the oblique system will relieve any counter-strain in the vertical system which might occur on account of undue deflection under the passing load.

While the treatment of the strains in the three web systems was essentially theoretical, a close examination of the vertical system during a passing load fails to reveal any tendency in the diagonals of that system to resist counter-strains. This conformity with the theoretical assumptions may be attributed to the adjustment in the oblique system.

The erection of the trusses was not a difficult matter and involved no unusual features. The old girders were removed from their bearings, lowered slightly, and placed on piles of marble. On these girders was constructed a skeleton platform, and on this platform the new trusses were assembled and riveted together. They were then lifted at the ends and swung into position.

The original design of the trusses provided for a span of 106 feet; but the required width of right of way was subsequently changed by the railroad company, and, in consequence, the trusses were constructed 87 ft. 7 in. between centres of columns. The depth of each truss, from out to out of chords of the vertical system, is 8 ft. The width is 4 ft. between centres of the chords of the horizontal system. The depth from base of rail to clearance beneath is 2 ft. 4½ in., including a 6-in. wooden stringer. The weight of each iron box girder, of 61 ft. span and 2 ft. depth, was 28,000 lbs., or 460 lbs. per lineal foot; its excessive weight being due to the material required in the flanges to reduce the deflection. The weight of each iron truss, as constructed, of 87 ft. 7 in. span, is 34,000 lbs., or 390 lbs. per lineal foot.

In measuring the deflection after completion, a piece of twine was stretched tightly from column to column under the stringer chord. There was no wind, and the twine was so tightly stretched that it would quickly come to rest after being disturbed. From this position of rest the position of the stringer chord could be readily measured. The largest stone at convenient disposal, weighing 10 tons (net), was lifted and carried at midspan, half-way between the two trusses. The weight of the traveler was also 10 tons, making a total load of 20 tons. The vertical deflection under this load measured one-half an inch; the horizontal deflection outward measured one-quarter of an inch.

The design of the trusses being novel, their unusual appearance elicited considerable criticism, and during erection prophecies of failure were freely made. It seemed much easier to explain why they must fail than to understand how they could succeed. The light vertical system and the upper chords were the particular objects of criticism, while the stringer itself apparently had no support. Subsequent developments, however, quieted these apprehensions. The trusses were designed to carry a load of 15 tons on two wheels 6 ft. apart, and the first load to which they were subjected was one of the old girders, weighing 14 tons. This was carried close to one of the trusses, and with the weight of the traveler was probably fully equal to that for which the trusses were designed. The result of this test relieved all further anxiety as to their efficiency, and the structure has since continued, under constant use, to give entire satisfaction.

An American Society of Civil Engineers.

BY J. B. JOHNSON, M. AM. SOC. C. E.

I propose to discuss the need, the organization, and the legitimate aims of a truly representative and inclusive American Society of Civil Engineers, and to suggest a method of their attainment. It is, I think, generally admitted that the American Society of Civil Engineers, as now constituted and controlled, is not performing the functions of a truly American society, and that on its present foundation it is never likely to attain to any very great degree of success in this direction.

In this age of rapid material progress, no profession, the practice of which falls within the realm of applied science, can afford to dispense with the advantages arising from the co-operation and mutual helpfulness which come only from intimate association in a professional capacity. No man's experience and field of research can be very large, and it is only by availing ourselves of the experience and discoveries of others that we can become eminent in a profession which covers almost the whole realm of applications of mechanical principles to the needs of man. The professional journals bring us much, but even these are largely supplied with matter from the society proceedings. Almost all that is valuable in the literature of science and its applications to-day comes to us through the agency of the scientific and professional societies. Furthermore, the progress of the engineering profession, as well as others depending on this kind of knowledge, is principally due to the vast amount of available literature constantly detailing the latest discoveries, successes, and failures, the world over. The production of this kind of literature is, therefore, at once the cause and the indication of progress, and is not to be deprecated by even the most experienced and learned in any profession. One of the principal objects of any organized professional body should be the bringing out and making available to all the experience and learning of its individual members.

This is the more necessary in the case of an American

Society of Civil Engineers, since the demands upon the American engineers and the resulting practice have been, and will continue to be, unique. European experience and practice are of little avail in solving our problems. It is American experience we want, but, strange to say, this is exactly what it is most difficult to get. European experience and practice are much better written up, and very much more available to American engineers than that of their own country.

In France an engineer will build a bridge or a retaining wall and write a book about it. In America an engineer will build 100 bridges, many of them of new and difficult designs maybe, or 10,000 miles of railroad, or improve 1,000 miles of river, or irrigate 10,000 square miles of land, or bring the waters of Niagara to do the work of 1,000,000 men, and never write a word about it. Only a few of his fellow-engineers know what he has done. The public generally see and enjoy the results of his labors, but never know to whom they are indebted for these great blessings. The engineer is as completely hidden from the public eye in this country as the stage manager at a theatrical performance. He is nothing to them, and it is not surprising that they make little or nothing of him. We complain that we are not appreciated by the community, and yet we deliberately choose to remain out of sight, and therefore out of mind. Everybody knows who built the first St. Louis bridge and who improved the mouth of the Mississippi, but no one will know who built the second St. Louis bridge (for a quarter of the money) or who improved the mouth of the Brazos, and thus gave to Texas and the great Southwest an outlet to the sea.

It is a standing reproach to the present American Society of Civil Engineers that they produce so little valuable engineering literature. It was but a few years ago that a member said, in a paper on the reorganization of the Society, that "no man ever joined the American Society for the sake of its proceedings." This was probably putting it too strong, but there is no question that the production of engineering literature has been an incidental rather than a primary subject of the Society. The primary object seems to have been what the writer above quoted called "the diploma of membership." That is, the object in joining was the honor of belonging. In other words, the American Society of Civil Engineers has been primarily an honorary body, and only incidentally a working body. The writer has had the pleasure of attending three annual conventions of the Society, and these occasions have had more the air of a pleasure excursion than of business. Few papers are presented, and the reading of these has been attended with little interest or discussion. The ardor of the young member who came to learn from the older and more experienced in his chosen profession has always been dampened and his enthusiasm cooled in these annual gatherings. The resident members have had regular monthly meetings through the year in New York City, and then at the annual convention the country members are called in and we all go off for a ten-day's picnic. Out of the whole ten days perhaps as many hours will be devoted to the reading of papers, which have already been printed and circulated, and in some random and more or less profitless discussion. To the New York member who has had the opportunity of attending the monthly meetings through the year this is all very well, but for the country members, who have no other society opportunities, the net profits seem meagre as compared with the possibilities of such an occasion. In other words, The American Society of Civil Engineers, as now constituted, is a local society with a national constituency. Is there any way in which it may become a really American society?

There are two prime requisites to such a society: It must be American in its inclusiveness. It must be American in its equal and impartial benefits.

It should be inclusive of, or superior to, and not co-ordinate with, all other civil engineering societies in the United States and Canada at least. Its benefits should be as uniform and impartial as possible over this same territory.

The objection will be raised at once that this is impossible on account of the immense area covered. I do not mean that an engineer five hundred miles from civilization shall have the same advantages as though he lived in New York City, but I do mean that twenty or fifty members of the society resident in Boston, Philadelphia, Washington, Cincinnati, Chicago, St. Louis, Kansas City, Cleveland, Minneapolis, Denver, New Orleans, or San Francisco shall have practically the same advantages as those resident in New York City. At present the American Society of Civil Engineers is co-ordinate with, and superior to only in name and in numbers, the Canadian Society of Civil Engineers, the Western Society of Civil Engineers (Chicago), the Technical Society of the Pacific Coast (San Francisco), the Engineers' Club of Philadelphia, the Engineering Society of Western Pennsylvania, and the engineering societies of Boston, Cleveland, St. Louis, Kansas City, Minneapolis, St. Paul and Montana.

We should have *an* American Society of Civil Engineers which should either replace these various societies, or else be superior to and inclusive of them, as the United States government is superior to and inclusive of those of the several states. Is it practicable to do this? Can these various engineering organizations be brought into one united, consistent, inclusive, impartial, and at the same time manageable and highly worthy and honorable society of engineers? I think this can be done, but it will take time, and for this reason a beginning should be made at once. All the necessary changes in the constitution of the American Society could be made in the present contemplated revision, and the rest would follow naturally.

Proposed Organization of the American Society.

The principal change required is the organization of chapters to replace (ultimately, if not at once) the other existing societies. There is no reason why this new American society should not include in some class all persons who could be profitable members of the local societies. There are doubtless now many members of the local societies who could not be included in the present grades of membership or who would not be willing to pay the fees now asked by the American Society. The most serious question in the whole matter is whether a sort of chapter membership, or associate membership, should be created, which would be independent of membership in the society at large.

I am inclined to think this should be done, at least temporarily. They should not be dropped out entirely because not eligible to membership in, or not desirous of becoming members of, the American Society. They are now members of the local societies and might desire to remain associated with the local members, and to help pay the local expenses of such organization. They would really be associate members of the several chapters, and should be elected by the chapter alone, but would have no standing or membership in the society as a whole. What should they be called? How would this do: Associate of the St. Louis Chapter of the American Society of Civil Engineers? They would pay no dues to the American Society. If they wished the proceedings, let them buy them, the same as other non-members. Some of them would not care to pay for the proceedings. Then let a committee on membership be appointed in every chapter by the society at large, perhaps, whose business it would be to pass upon qualifications of and recommend to the central committee on membership all candidates who are members of their chapters, in any grade, who wish to become members of the society at large. This puts some official responsibility on members who have personal knowledge of the candidates, but does not give them final authority to recommend the party at once to the society at large for election.

In the matter of reading and publishing papers, let the paper be read first in the chapter where the author belongs and let a local committee on publication pass upon it. If it seems desirable to obtain a discussion upon it, let it be sent to the central committee, with the recommendation that it be printed and circulated for discussion. It then takes its course as papers do now. Papers read by associates of the chapters should be treated the same as those read by full members. All papers should stand on their merits alone. Many papers should be published by abstract. It is a remarkable fact that this is not done now at all in America. A paper is either published entire or not published at all. It should be the privilege of the chapter committee on publication, and the duty of the general or central committee on publication, to order abstracts to be made of papers which are not sufficiently important or are too prolix to publish entire. By doing this a much larger mass of matter could be successfully dealt with than is now published in all the society proceedings combined, without an undue increase in the volume of the proceedings.

The index notes of current engineering literature could then be made more complete, and hence more valuable, than those which the Association of Engineering Societies has published for the last five years. Perhaps important papers in foreign periodicals and society proceedings could also be abstracted, as is now done by the Institution of Civil Engineers. Then we should have in a single publication most of the valuable civil engineering literature of America, and an index to, or an abstract of, all the most valuable in foreign countries.

A great advantage of the local chapters is that a writer of a paper could usually read it himself, which is always a satisfaction. In fact, many more papers would now be presented to the American Society if the writer could attend the meetings in New York and read and take part in the discussion of his own paper. On this account, the local societies now receive many papers written by members of the American Society, which would otherwise be given to that society.

As a member of the Engineers' Club of St. Louis (one of the most active local societies in the country), and as a member of the board of managers of the Association of Engineering Societies, including now those of Boston, Cleveland, Chicago, St. Louis, Kansas City, St. Paul, Minneapolis, and Helena, Mont., I offer it as my opinion that a union with, or the absorption of, the local societies by the American society on some such basis as above outlined is feasible if the American Society will give assurance, by proper changes in its constitution, that it will become in fact what it is now in name—a truly American Society of Civil Engineers.

The local societies are usually made up of all kinds of engineers, but the national mining and mechanical societies have now no local chapters. They both meet three times a year, at different points over the country, and these are the only meetings held. All papers are presented at these meetings. They are strictly national societies. Many of their members, however, belong to the local societies also, and might wish to become members of the American Society of Civil Engineers, or at least remain as associates of the chapters. If the American Society will open the way for the organization of chapters, and make other changes, some of which are provided for in the proposed amendments put out by the Cincinnati members, with liberal provision for the absorption of the local societies, I believe a satisfactory union could be effected. The first thing is to decide what is desirable. If we can agree on this it will be easy enough to frame provisions for it on paper.

The great trouble now is the absolute indifference of a large proportion of the members of the American Society to the subject. The possibilities of a united and all-inclusive *American* society does not seem to have dawned upon them. But as American engineering beats the world for quantity and quality, so I see no reason why American engineering talent should not be recognized as highly as it is abroad and remunerated accordingly. This can only come by the engineer making himself felt in the community as a citizen and man of affairs, and by making himself known as the designer and executer of his own works. This can be largely effected by a more profuse publication of descriptions of engineering works by the engineers themselves, and by their taking a more active interest in the framing and enforcing of enactments in the interest of good engineering and the public good. This latter is best accomplished through an organization such as has been described. The mechanism of such an organization would come close home to most of the members. It would be compact and manageable, though widely spread over an entire continent. Small jealousies would cease, and the weakness of division into many distinct and separate bodies would be transformed into the strength and efficiency which accompanies union. I believe all engineers in this country would like to see such a union effected. There may be many ways of doing it. Only one way can be chosen. This will not exactly suit everybody. But the main thing is that it shall be done. Many things can safely be left for further adjustment. The thing now to discuss and arrange is a *feasible* method, and leave the *perfect* method to be evolved in the distant future.

Automatic Block Signals on the Pennsylvania.

The Union Switch & Signal Company's rail-circuit system of block signaling is now in use on six miles of the four-track road of the Pennsylvania main line east of Pittsburgh. The system has been in use between Wilkinsburg and East Liberty, about 2½ miles, for 5½ years, with a high degree of success and it is this that has led the company to equip the additional 3¾ miles. This latter portion of the road, from East Liberty westward, is shown in the sketch given herewith, and the signals upon it were put in operation on August 8.

As will be observed from the drawing, the signals are here arranged on the original plan as shown in models exhibited several years ago; that is, the blocks are short, averaging half a mile in length, and each stop or home signal has a distant or caution signal, which caution signal is placed upon the same post with the stop signal of the preceding block section. This simplifies the system for the engineer, reducing the number of localities that he must watch for, and also obviously simplifies the arrangement of the posts and apparatus. The distance between each caution signal and its corresponding stop signal is ample for bringing a train to a stop, and with caution signals for every block section on the open road the engineman may run at full speed on the most obscure positions of the road or in the densest fog, with the assurance that the signals will always give him at least the length of one block in which to stop after he has passed the post.

Instead of "banner" or "gridiron" signals operated by clock work (the best known form, and the one in use on the Boston & Albany, Old Colony and other New England roads), the semaphore is used and the power for moving the arms is compressed air. The apparatus is the same in its general features as that used to operate semaphores in the pneumatic interlocking system, which was described in the *Railroad Gazette* of Dec. 21 last, page 830, Figs. 8 and 10. A pipe extends along the roadway the whole six miles from Pittsburgh to Wilkinsburg, furnishing air not only for the block signals, but also for the interlocking apparatus at four towers. The distant signals are connected to the stop signals by a line wire on poles. The signals are arranged to go to danger *after* the engine of a train passes them. A train stopped by a home signal may, after waiting two minutes, proceed with caution, expecting to find a train on the block ahead or switches not properly set.

Cross Ties in India.

BY AN INDIAN ENGINEER.

When railroad construction was first commenced in India, many engineers and others were of opinion that wooden cross-ties would not be able to withstand the ravages of the white ant, and the use of timber which had been either kyanized, Burnettized or creosoted was considered imperative. Experience has, however, proved that these pests seldom, if ever, attack sound wood when laid in a running line, and that far more formidable enemies exist in the shape of dry rot, the sudden changes of temperature, etc. Creosoting has always been the process most in favor in this country, but in many cases the work has been very imperfectly done, and instead of the whole tie being impregnated, the surface only has been saturated to a depth of one inch, or even less. This is probably the reason why the inside of so many creosoted fir cross ties are found decayed, while the exterior is to all appearance sound. Some years ago a district engineer objected to the removal of some ties which appeared fit for several years further service, but happening to strike one of them rather sharply with the point of his walking stick, he was surprised to find the wood give way, and that what appeared a serviceable tie was in reality nothing but a shell not an inch thick.

Although many English and Continental engineers maintain that the use of chemicals materially increases the life of ties, such has not been found to be the case in India, and even where the greatest care has been taken, and the whole body of the tie thoroughly impregnated, the fibre of the timber immediately under each rail becomes destroyed long before any other portion of the tie shows signs of wear. This evil has been found to be so great that cast-iron chairs with extra

broad bases have been introduced on some lines, and where flat-footed rails are in use cast-iron bearing plates have been placed between the rail and the tie in order to prevent the rail damaging the wood. Neither plan has, however, remedied the defect, and the greatest life of creosoted fir cross ties under ordinary traffic (say 30 trains daily) may therefore be taken as 10 years.

The size of ties on the 5-ft. 6-in. gauge is 10 ft. × 10 in. × 5 in., and not more than 1,648 are used per mile of road, the spacing being 2 ft. from centre to centre at joints, and 3 ft. at all other points. The only wood which gives entire satisfaction is good sal. Ties made of this wood, without any sap, may be depended upon to last from 15 to 25 years, and they seldom require respiking to gauge. There are, however, several kinds of bastard sal, and these cannot be classed with the best sal. Many engineers prefer this wood to oak, and it is certainly the best wood for ties, beams, etc., ever tried on Indian railroads. The price has, however, risen considerably during the last two years. Although magnificent forests of this timber are still to be seen, it would be impossible to obtain anything like a sufficient number of ties for the maintenance of existing lines, to say nothing of the number yearly required for construction, and Indian engineers have for many years past devoted a great deal of attention to metal ties. The consulting engineers of the different guaranteed companies

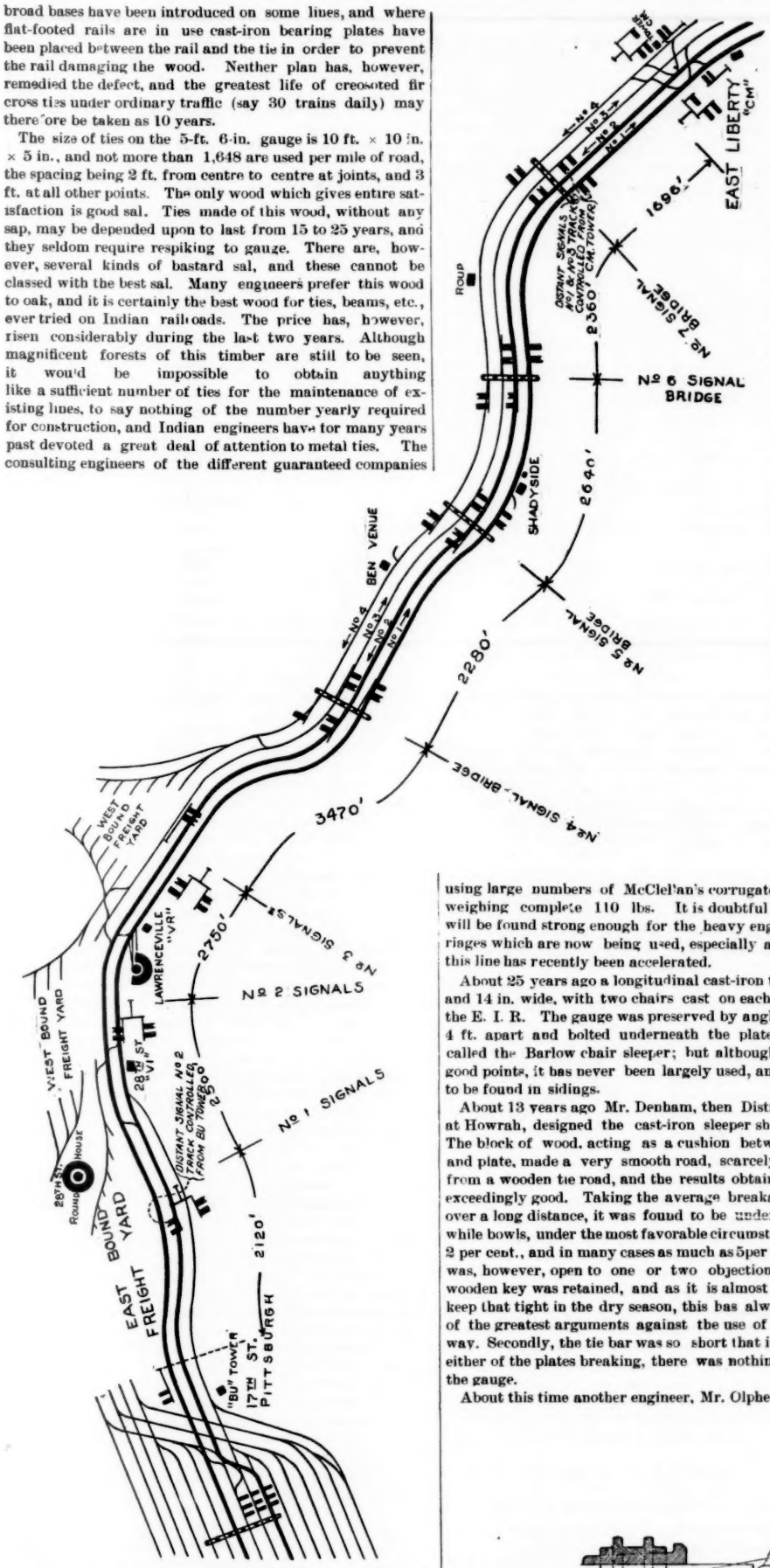


Diagram of Automatic Block Signals, Pennsylvania Railroad, between East Liberty and "B U" Tower, Pittsburgh.

appear to have foreseen this difficulty from the first, and more than 25 years ago bowl or pot sleepers of different types were sent out from England. The Greaves oval bowl has managed to hold its own on the Great Indian Peninsular Railway, and has also been laid on the new Midland Railway. The East Indian and Eastern Bengal lines, however, found that this type of material made a very hard road, unpleasant to run over and very damaging to both rails and rolling stock, and they consequently decided not to use it on the main line. In order to make the road laid with bowls more elastic, cushions of sal, or teak wood, 5½ in. × 2¾ in. × 1 in., have been placed in small recesses cast in the bowl, one on each side of the chair; but these having been found to crush rapidly, the Great Indian Peninsular is now trying cushions of tarred felt. One very noticeable fact in connection with bowls is that the lines using them rarely, if ever, run trains at a greater speed than 25 miles per hour, and it is said that when fast trains, such as the viceroy's special or a special mail, do exceed this speed the number of breakages is very great.

The Oude & Rohilkund Railway has been for some years using large numbers of McClellan's corrugated steel bowls, weighing complete 110 lbs. It is doubtful whether these will be found strong enough for the heavy engines and carriages which are now being used, especially as the speed on this line has recently been accelerated.

About 25 years ago a longitudinal cast-iron tie, 36 in. long and 14 in. wide, with two chairs cast on each, was tried on the E. I. R. The gauge was preserved by angle irons placed 4 ft. apart and bolted underneath the plates. This was called the Barlow chair sleeper; but although it had some good points, it has never been largely used, and is now only to be found in sidings.

About 13 years ago Mr. Denham, then District Engineer at Howrah, designed the cast-iron sleeper shown in fig. 1. The block of wood, acting as a cushion between the chair and plate, made a very smooth road, scarcely to be known from a wooden tie road, and the results obtained have been exceedingly good. Taking the average breakages per year, over a long distance, it was found to be under ⅛ per cent., while bowls, under the most favorable circumstances, showed 2 per cent., and in many cases as much as 5 per cent. This tie was, however, open to one or two objections. First, the wooden key was retained, and as it is almost impossible to keep that tight in the dry season, this has always been one of the greatest arguments against the use of chairs in any way. Secondly, the tie bar was so short that in the event of either of the plates breaking, there was nothing to preserve the gauge.

About this time another engineer, Mr. Olpherts, designed a cast-iron tie with a fixed inner and loose outer jaw. The tie rod was of round iron, and the gauge was preserved by nuts at either end. It was soon evident that the outer jaw being loose was a weak point, and the screwing of the tie bars would also have been expensive. Finally the patents of Messrs. Denham and Olpherts were combined, and the result is the well-known D and O. sleeper or tie. The first pattern tried did not altogether do away with wood, and it was found that the cushions crushed very soon under heavy traffic. If the cushions were not renewed in time, the outer jaw very soon gave way, and this occurred when the cushions were a little too high. A new model was made, fig. 2, which did away with the use of wood, and at the same time the key was shortened to 2 in., and, instead of passing through both plate and tie bar, passed through the latter only. It will be seen from the drawing that the rail is suspended by the upper head, and this not only makes the road very elastic, but also prevents the under side of the rail from being notched by the chair.

It has been before mentioned that the great rigidity of some types of cast-iron ties is a strong objection to their use, but with the Denham and Olpherts patent tie the road is quite as elastic as any wooden road; and as both tables of the rail can be used, instead of one as formerly—when a considerable percentage were so indented as to be useless—each rail may be said to have its life doubled.

In addition to this there are no spikes to be stolen, no wooden keys to work loose, nothing to catch fire, and the whole is so tied together by the wrought-iron tie bar and cotter, that even if both plates break the rail is held securely, and the gauge maintained. The East Indian has now more than 1,200 miles of road laid with this tie, and is relaying from 50 to 100 miles of road every year, thus reducing the demand for wood, and consequently preventing the price rising so rapidly, as it would otherwise do. The Eastern Bengal is also using large numbers of D. and O. ties, and the results obtained are so good that neither is likely to use any other type of metal tie.

The percentage of breakages on the East Indian has always been very small, and during the last three years has been reduced from .55 to .42 per cent. It was at first thought that soft ballast would be required in order to pack them properly and prevent breakages, but Mr. Denham, now Chief Engineer of the East Indian, has always been a strong advocate for stone ballast, and only the hardest procurable stone is now used with his patent tie.

On the Frontier Railway steel trough ties were first put down about three years ago, but have not been long enough in use to allow of a definite opinion being formed as to their suitability for India. The general impression is that the metal will oxidize very quickly in all parts of the country, and especially where the earth contains any salt. There is also some difficulty in changing rails or renewing ties when this type of material is used, and they possess the defect, so common to steel ties, of being very thin, and therefore are liable to be bent and distorted if any portion is not properly packed. The theory of the patentees is that the whole of the trough will be thoroughly filled with ballast, which will assist in resisting compression; but, unfortunately, it is not at all easy to insure this in practice, and few, if any, hollow ties are packed evenly over their whole surface.

The Bengal Nagpur Railway, now under construction, is also using steel ties, trough-shaped, and there is a chance of other patterns of steel ties being tried on other lines before long.

The new company which is being formed to take over the Burrakur Iron Works proposes to erect a plant for making steel ties, and eventually steel rails. This will no doubt lead to a more general use of steel, if a suitable pattern can be devised.

A cast-iron tie, designed by Sir Bradford Leslie, is in use on the Hooghly branch of the East Indian Railway, and makes a fair road, but when tested by the drop weight the plate stands only 5 ft., against 9 ft. as prescribed for the D. and O. plate. The weight in each case is 3½ cwt., and commences with a fall of 2 ft. Mr. Moore, Deputy Consulting Engineer, has also lately patented a cast-iron tie, which he

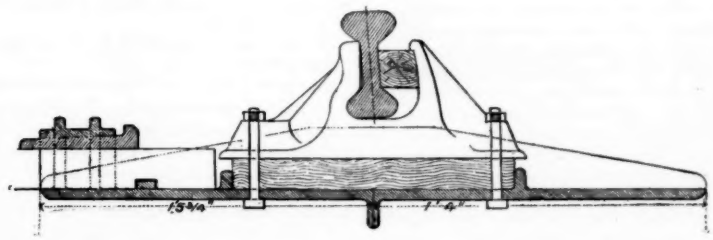


Fig. 1.

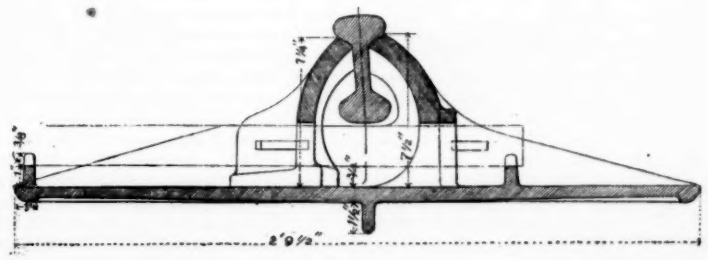


Fig. 2.

claims has less defects than the D. and O.; but this is rather premature, it having scarcely been tried yet.

The relative cost of the different types of ties may be summarized as follows:

Nepal. sal,	uncreosoted,	each,	rupees	5	0
Teak, Burmah,	"	"	"	6	0
Teak, Johore,	"	"	"	5	0
Jarrah, Australian,	"	"	"	5	4
Red gum, "	"	"	"	5	0
Asure,	"	"	"	5	0
Creosoted fir,	"	"	"	5	0
Cuttack, sal, uncreosoted,			"	4	12
Deodar., uncreosoted,			"	4	0
Steel trough, complete,			"	7	8
Steel bowls, corrugated,			"	7	4
Oval bowls, cast iron,			"	6	8
Denhams, cast iron,			"	6	0
D. & O., English made, cast iron,			"	.	..
D. & O., country made, cast iron,			"	6	0
Leslie's, country made, cast iron,			"	6	8
Barlow's, English made, cast iron,			"	6	0

It must be borne in mind that the metal ties are complete while the wooden ties have each to be supplied with 2 cast-iron chairs, 2 wooden keys and 4 iron spikes, and this increases the cost by about, rupees, 1 8 each, therefore the metal ties compare favorably with wood. There will always be a certain quantity of wooden ties used for laying switches and crossings, on bridges, etc., but the quantity required will be less every year. Many girder bridges are now being floored with corrugated or buckled plates, covered with a layer of stone ballast 1 ft. thick. This makes it possible to use metal ties on bridges, although up to date only wood has been used in such places.

Some engineers and roadmasters still object to metal ties, and a portion of the public appears to be of opinion that their use is conducive to accidents. A few days ago one of the Calcutta dailies made a long tirade against metal ties, and hinted that were it not for the influence of those interested in the iron trade they would not be used, adding that the public, being averse to railroad accidents, was not in favor of them. This shows how those who are not competent to form an opinion on matters which they write about may lead people astray. Metal ties have never been more in favor than they are now. The East Indian Co. has increased its foundry accommodation, and turning out 1,000 plates, 1,000 jaws, 1,000 keys, 1,000 cotters and 500 tie bars, equalto 500 complete D and O ties daily. The Anderson Foundry Co., of Scotland, has also an order for 100,000 of the same pattern, and other orders are being placed in England and Scotland. This speaks well for the iron trade, as well as for the prospects of railroad construction, and it is quite possible that within the next ten years Indian railroads will be as independent of imported ties as they now are of wooden ties, a consummation most devoutly to be wished for by all who are interested in the progress of the country.

Abolition of Grade Crossings in Philadelphia.

On Sunday, Aug. 18, the six grade crossings on the Pennsylvania Railroad in Philadelphia, between Frankford Junction and 83d mile post tower, on the New York Division, a distance of a mile and a half, were abolished. This was accomplished by raising the grade of the railroad, the new grade being in some places eight ft. higher than the old roadbed. The six street crossings, two of which have a very heavy traffic, a line of dummy cars on one and a horse car line on the other, are to be placed under the railroad by depressing their grade. But two are now open under the tracks, the other four having been temporarily abandoned.

The work of changing the grade was started last May by throwing the traffic on tracks Nos. 1 and 2, using No. 1 for all east-bound trains and No. 2 for all west-bound trains. After this was done tracks Nos. 3 and 4 were filled in to their new grade and temporary pile bridges put in over three of the streets.

At an early hour last Sunday these tracks were put in use in the following manner. Track No. 4 was connected and the west-bound traffic from track No. 2 diverted to it. Before this could be done, however, the street railroads had to arrange to transfer their passengers over the railroad so that the bridges could be completed, there not being head room enough under the bridges on the new grade until tracks Nos. 1 and 2 could be taken up, which would allow the streets to be depressed.

The work of putting in the two temporary bridges was started by a large force of carpenters about 9 p. m. Saturday, and was completed at 3 a. m. Sunday, and track No. 4 put in use and track No. 2 abandoned. As soon as this was done, some 300 or 400 trackmen and three gravel trains started work on widening out the bank for track No. 3, which could not be done until No. 2 was abandoned, as the foot of the slope overlapped the north rail of track No. 2. This work was rapidly pushed, and at 10 a. m. No. 1 track was abandoned and No. 3 put in use, completing two of the tracks on the new grade.

Before winter tracks Nos. 1 and 2 will be brought up to their new grade and permanent bridges put in, completing the change of grade.

Locomotive Chart—Northern Pacific Railroad.

The accompanying sketch shows a most complete arrangement, in use on the Northern Pacific, for recording the location, kind and condition of their locomotives.

It consists of a large cabinet about 9 ft. 6 in. long and 7 ft. in height. The base, 18 in. high, contains a double set of drawers, in which are kept performance sheets, etc. The rest of the cabinet, above this, is divided by vertical partitions into 18 sections, these in turn being sub-divided horizontally into 60 spaces, thus making over 1,000 separate pockets. These pockets are 5¾ in. long, ⅝ in. wide and ¼ in. deep. Each vertical section is used for a particular division of the line, the horizontal sub-divisions being used each for a locomotive and the particular division being designated by a white block, on which is painted the name of the division, with its length in miles. Below this follows a list of the engines, the number of each one being painted in red, while in smaller letters and figures, in black, are the size and number of driving wheels, dimensions of cylinders, builder's name and year of delivery. These blocks are 2½ in. long by ¾ in. sq.

The remaining space is filled up with ¾-in. cubes, bearing, in black letters on a white ground, such information as class of service in which the locomotive is employed, its condition, kind of brakes, smoke boxes, engine truck and tender wheels. Further remarks, as W. R., "waiting repairs," and W. S., "waiting service," are also used.

Thus a complete record of each locomotive is kept by simply changing the blocks or turning up another face of a cube, which is done each day as the reports come in.

From the top of the cabinet are suspended maps of the line and its divisions on rolls, and the whole can be inclosed with a sliding wooden curtain similar to that of a roll-top desk.

The cabinet was designed by Mr. C. E. Craig, Chief Clerk of the Motive Power Department, and it was built at the company's shops at Como.

New England Roadmasters' Association.

The Seventh Annual Convention of the New England Roadmasters' Association was called to order at 2:30 p. m. on Wednesday, the 21st inst., at the American House, Boston, with President J. R. Patch in the chair. After the reading of the roll call, Secretary's and Treasurer's report, constitution and by-laws, the following officers were elected for the ensuing year: President, G. W. Bishop (Fitchburg); Vice-President, W. E. Clark (Vermont Valley); Chaplain, J. S. Lane (New York, New Haven & Hartford); Secretary and Treasurer, W. F. Ellis (New York, Providence & Boston). Executive Committee, consisting of the President, Vice-President, Secretary and Treasurer, C. S. Lane (New York, New Haven & Hartford), J. W. Shanks (New London Northern). C. B. Lentell (Boston & Albany), G. L. R. French (Boston & Maine).

The first report read was that of the Committee on Repairs of Track.

An abstract of the discussions will be given next week.

REPORT OF COMMITTEE ON REPAIRS OF TRACK.

1. Method of renewal of rails, frogs and switches.

Renew with special iron gang who curve or straighten the rails and lay them, putting in all needed ties and tamping them, leaving the track for the section men to dress off, finish up and pick up the old material.

2. Best method of renewal of ties and tamping of same.

Renew by putting the best ties under the joints, lining all ties on one side of single track and on outside of double track, putting large end of ties on inside of curves, tamping all ties with bar and filling each day, commencing at one end of section and continuing through. All ties should be put in main track before July 1.

3. Ballasting and surfacing.

Raise track with jacks, tamping with shovel, spacing all ties equally under each rail, afterward tamping with bars.

4. Maintenance and alignment of tracks on tangents and curves.

Commence surfacing at end of section where commenced to put in ties, raising all that are low, using spirit level on every joint, tamping all ties raised or that are loose, lining each curve and tangent after it is tamped, and before filling in dress off, leaving ballast as high as top of tie in centre of track, and one inch space under rail with line of ditches parallel with line of track.

R. HYLAND,
W. E. CLARK,
E. W. HOSMER,
Committee.

REPORT OF COMMITTEE ON CATTLE GUARDS.

Best form of construction and material to use, with estimate of cost.

Cattle guards as they exist on almost all railroads are a nuisance, yet they are necessary at crossings where there are no flagmen. The question as to what is the best guard is not easy to answer. The Committee is opposed to all trenches or pits with walled sides and stringers across lengthwise under the rails for the following reasons:

1. We do not consider them effective. We know of a case where a cow got partly down into one and could not get out; the train coming along was derailed because the pilot had no chance to get under the obstruction and throw it from the track. If there had been no pit there the animal might have run clear of the train. If struck by the engine in 99 cases out of 100 it would have been thrown to one side without damage to the train.

2. Few of our New England roads have any too much ballast or material under the tracks not affected by frost. The trenches are 3 or 4 ft. deep and go through the roadbed or ground. The frost gets into the poor bottom, throws the track up, causing the trackmen to shim the track on both sides 3 or 4 in. during the winter. When frost comes out the guard remains high, and it takes constant care of section foremen to keep the place in good order. It is almost impossible to keep these guards in good repair, so that they will not be felt by passengers in fast trains running over them. The passengers may not know what causes this sudden pitch and jump, but the roadmasters know.

The best guard which has come under the notice of your committee is called the "National Surface Guard." The wooden ones are made of 3½ in. white oak sticks, sawed diagonally. The three-cornered strips, 12 ft. long, are spiked close together on top of the ties between the rails and tracks, and run outside the tracks as far as necessary.

Your committee recommend the "National Surface Guard," in iron, or the one just described, in wood, as the cheapest, best and most efficient cattle guard. Of course with a little different arrangement the guards may be made removable for repairs to track, or in winter, if necessary.

C. B. LENTELL,
C. S. SLAFTER,
L. J. SPAULDING,
Committee.

EXHIBITS.

Among the exhibits were the following:

Dunbam Manufacturing Co., Boston, the Servis tie plate and Davies steel lock spike.

Buda Foundry & Manufacturing Co., Chicago, Ill., patent wood car wheel and wood wheel hand car.

Josiah Barrett, Allegheny City, Pa., Eureka track jack.

National Lock Washer Co., Newark, N. J., the national lock washer.

James B. Brady, representing Manning, Maxwell & Moore, 113 Liberty street, New York, Smith's portable rail saw.

James B. Brady, Sales Agent for the A. J. Hartford Steel Railway Tie Manufacturing Co., New York, the Hartford steel tie.

George J. Akers, General Agent, Fairbanks, Morse & Co., Chicago, Ill., the Barrett track, bridge and car jack; the Sheffield section hand and push car and railway velocipede; the improved Sheffield-Dodge stand pipe.

Weir Frog Co., Cincinnati, O., models and blue prints of the Weir steel frog.

ST. PAUL DIVISION.

143.4 MILES.

167	17 × 24 4-62 in. Baldwin, 1883.	Pass.	Good.	Brakes, Train.	Ex. Front.
257	17 × 24 4-62 in. N. Y. Loco. Works, 1883.	Freight.	Fair.	Brakes, Train. Driver. Water.	Steel-tired Eng. Truck Wheels.
448	19 × 26 6-59 in. Manchester, 1888.	Construction	Poor.	Brakes, Train Driver.	Steel-tired Eng. Truck and Tender Wheels.
464	20 × 24 8-49 in. Baldwin, 1883.	Helper.	Shop.	Brakes, Train. Train Signal.	Ex. Front. Steel-tired Eng. Truck Wheels.
151	16 × 24 4-62 in. Hinkley, 1883.	Switch.	W. S.	Brakes, Train. Driver. Train Signal.	Ex. Front. Steel-tired Eng. Truck and Tender Wheels.
204	17 × 24 4-62 in. Portland, 1882.	Work.	W. R.	Brakes, Train. Driver. Water. Train Signal.	

J. R. Ellicott, 115 Broadway, New York, a spring rail frog and a solid wrought-iron filled, upset point frog.

The A. French Spring Co., Pittsburgh, Pa., the Noble washer.

The Bush Interlocking Bolt Co., Philadelphia, Pa., the Bush interlocking bolt.

The F. F. Waters Manufacturing Co., 38 Oliver street, Boston, Smith's friction track drill.

Beary & Hawk, Philadelphia, Pa., the International ratchet nut lock.

The Jones Safety Nut Lock Co., Syracuse, N. Y., The Jones Safety Nut Lock and The Jones Safety Switch Lock.'

D. E. McSherry & Co., Dayton, Ohio, The Maxon Patent Lever Jack.

The Higley Sawing & Drilling Machine Co., 45 Broadway, New York, the Higley Patent Rail Saw.

Ruffner, Dunn & Co., Philadelphia, Pa., the Excelsior single and double automatic nut locks and fish plate springs.

J. H. Sternbergh & Son, Reading, Pa., and the Kansas City Bolt & Nut Co., Kansas City, Mo., the oval body track bolt.

Joyce, Cridland & Co., Dayton, O., Joyce's patent lever jack.

Andrew Warren, St. Louis, Mo., a track jack.

The Electric Light Convention.

The tenth semi-annual meeting of the National Electric Light Association was held at Niagara Falls, N. Y., on Aug. 6, 7 and 8. About 300 members and visitors were present. President E. R. Weeks, in his opening address, stated that the objects of the gathering were primarily to further the interests of the local companies, and, secondarily, to aid in the general development of the business and to promote the good of manufacturers of electric apparatus and supplies. While the arc light business was steadily increasing, the greatest development has been and must continue to be in other directions. The superiority of the incandescent as a supplement to the arc light was now more generally acknowledged, but owing to the commercial value of the residual products of the manufacture of gas, the incandescent light cannot compete with it in price. Without a perfect subway system and storage battery it cannot be so reliable. Hundreds of thousands of dollars are being expended in experimental subway work, but many years must elapse before a complete solution can be reached.

The outlook for the alternating current was encouraging, and more exact work was now being done in that line. The invention of meters and motors for this current had added greatly to its commercial value.

The number of arc lamps in service in the United States has increased during the past six months from 219,924 to 237,017; incandescent lamps, from 2,504,490 to 2,704,768. The number of street railroads operated by electricity was now 109, comprising 575 miles of track and 936 motor cars. The capital now invested in these industries was $275,000,000.

An address of welcome was delivered by Hon. W. C. Ely, of Niagara Falls, who gave the following sketch of the topographical features of the vicinity, which are of special interest in connection with the various plans suggested for the utilization of the vast water power:

To the eastward of the village for several miles the land is nearly level with the waters of the river, which there move slowly in a broad body; then the rapids succeed, and then the plunge at the Falls, 160 ft., and below the chasm, 200 ft. deep. From the water level in the chasm below the Falls it is proposed to excavate a tunnel 24 ft. in diameter, extending under the village eastwardly at an ascending grade of 1 per cent., which tunnel will approach within 400 ft. of the river, just east of the present hydraulic canal, and at that point will be 125 ft. below the surface of the land and the waters of the upper river; thence it will extend eastwardly with a slightly modified grade and parallel with the river, about 1½ miles, and at its easterly termination will still be 90 ft. below the surface, and in diameter 10 ft.; the same having been gradually narrowed to that limit in the last 1½ miles of its length. This tunnel will serve as a tail race, simply to discharge water. Immediately above it will be constructed lateral tunnels at right angles with the river and the main tunnel. On the surface of the land and also at right angles will be excavated surface canals, into which will be diverted the waters of the river. By the side of these canals wheel-pits can then be excavated, and in them turbine wheels placed at a depth of 100 ft., and arranged to discharge directly into the lateral tunnels below, and thence through the main tunnel and into the river below the Falls. This system of transverse canals and tunnels would discharge 864,000 cu. ft. of water per minute, and furnish 119,000 H. P., and this power is not situated in the midst of inaccessible mountain ranges, but midway between New York and Chicago, on the great trunk lines of railroads with unsurpassed shipping facilities. The advantages of the situation are apparent at a glance. As enumerated by Thomas Evershed, the originator of the tunnel idea, and summarized by a very high engineering authority in his indorsement of Mr. Evershed's plans, they are: An exhaustless supply of pure water at a practically constant head; solid and durable rock containing all the tunnels, shafts and conduits, and furnishing imperishable foundations for all the structures, and a practically uniform surface of the lands necessary for manufacturing structures.

Dr. Otto A. Moses was named by the convention as conferree to act on the committee of 100 to be appointed by the Mayor of New York on the proposed exhibition of 1892.

Mr. M. D. Law, of Philadelphia, then read a paper on "The Perfect Arc Central Station." The station should be located as near as possible to the centre of the district to be lighted, but if sufficient ground could not be obtained at a reasonable cost it was better to go a little to one side than to be cramped for room. When breakdowns of machinery occurred there should be room to make changes without interfering with the continuity of the service. Electric lighting could not be considered a success until all danger of leaving subscribers in darkness was removed. The boiler room should be located on the ground floor with plenty of ventilation, making it cool and comfortable. Automatic dampers should never be used, as with them it is impossible to get proper combustion, and they have a tendency to make firemen careless.

Electric lighting is one of the hardest kinds of work for the steam engine, the continuous running and the throwing on and off of the load instantaneously causing immense strains. Twin engines should be used, connected at right angles, giving steadier power than single engines. They should be built especially for the work, having a larger amount of iron in their parts than is used in an ordinary commercial engine, so that in case of an emergency they can be forced beyond their normal load for a short time. For a 1,000-light station there should be two 23 × 48-in. twin engines, running at a speed of from 70 to 80 revolutions. With this number and size of engines there will be a reserve of one engine, as the three engines will easily carry the load of 1,000 lights. The Corliss type of non-conducting engines, properly constructed and handled, are the most economical, using less than 2½ lbs. of coal per horse power hour, working at 110 to 115 lbs. steam pressure. High rotative speed is not necessary for electric lighting, but it does require a uniform speed. An engine running 40 revolutions per minute, provided the speed is regular, would make as good lights as one running 300 revolutions. It has been practically demonstrated in a great number of plants using small high-speed engines that such is the fact, the low speed requiring less coal, oil and attention, while the cost of repairs was very much less, as well as loss of steam from radiation, clearances, etc. On a pair of Corliss engines, 23 × 48 in., at 75 revolutions per minute, running day and night for nearly 7 years, the actual cost for repairs was but $25, and during that time they were shut down but once on account of breaking, and then only 10 mins. to disconnect the engine, the other being run with the lead of both at increased steam pressure. The friction of a high rotative speed engine and a 60-light dynamo is 6 indicated h. p., while the friction of one pair of engines, shafting, 22 empty dynamos, 11 idlers, and 22 Hill clutch pulleys, 5 ft. in diameter and 12-in. face, is but 72 indicated H. P. The only argument against large engines is that in case of breakage it stops the whole plant, whereas with small engines it will stop but one dynamo.

The dynamos should be small and mounted on cast-iron beds, left entirely open, so as to allow perfect cleaning, as the life of dynamos depends very much upon their cleanliness.

The switch-board should be placed in the middle of one side of the dynamo room and 4 ft. from the wall, and should be at least 25 ft. long, which will give room for 50 circuits. As it is impossible to keep all circuits built up to the full capacity of the machine, it is well to have a number of small circuits to couple in, in order to build up to the full machine capacity, as all dynamos work more economically at full load. Ammeters, lightning arresters, indicators and all connections should be placed on the switch-board. All lines should be tested for grounds at least three times a day and once every hour while the lights are burning. As soon as a ground occurs it should be immediately found and cleared. The shop should be of good size and provided with at least one 12-in. lathe, drill press, buffing wheel and a variety of small tools. The test rack should be located in the shop, and be large enough to hold at least four lamps, each lamp to be provided with an adjustible lens for focusing the arc on a screen. This affords an oppurtunity of closely watching the arc without injury to the eyes.

In the discussion that followed the statement of a seven years' run with an expense of but $25 for repairs was questioned, and Mr. De Camp, who admitted that the station described was that of Philadelphia, said that the engines did run 7 years, an average of 22 hours per day the year round, with the exception of Sunday, when they were stopped 8 hours. They use first-class oil and the engines have good care, which the company pays for. He believed in the Corliss engine, but he was told that you must have a Corliss man to run a Corliss engine; he must understand the engine and be in love with it.

Mr. Lynch was surprised to learn that no electric street railroad lines take their current from local electric light companies. One reason probably was that the standard of potential varied and that electric light companies were loath to supply the current because different apparatus would be required for different systems. A committee of three was appointed for the purpose of endeavoring to bring about the use of a standard potential in street railroad work.

A paper by William Bracken was then read on electrical traction by storage batteries, in which the query regarding the life of a storage battery was answered by the statement that a life of six months from the positive plates was sufficient, but it is found that they will last much longer than that. The reason why this question has been considered so important heretofore was because of the high cost of the battery. Most of the material in a battery has to be bought but once, because it can be made over. The raw material in two sets of battery capable of running a car 120 miles a day costs, exclusive of the containing jars, about $300. A sufficient number of horses to run such a car 120 miles per day would cost $4,000, while the necessary battery for the same work would cost but $1,500. The batteries can be maintained for about one-half the cost of the horses, which includes replacement as well as feed. The cars on the Fourth Avenue line, New York City, require one electrical horse power mile. The road has some long gradients, that at Centre street being over 1½ per cent. and 600 ft. in length. The cost of motive power for a car day of 75 miles they estimate at $3.40 as against $7.50 for horses.

Mr. Benj. Rhodes presented a paper on the economical size of line wire for constant current circuits. It was made up of formulæ for making the necessary calculations.

Mr. Geo. W. Mansfield, of Boston, read a paper on electric railroads. He opened with a brief summary of the importance of the street railroad interests in the country, showing that there were 425 companies employing 125,000 horses and operating 3,500 miles, having an invested capital of about $175,000,000. To operate the street cars of New York City a dynamo capacity of 13,800 H. P. would be required, in Boston 9,500 H. P., and other cities in like proportion. Preparations were now being made in Boston for the establishment of a central station for generating 8,000 H. P. to be used in operating practically the entire system of street railroads in that city by electricity. Attention was called to the necessity of establishing some system of charging for current supplied by electric lighting companies for railroad purposes. Power is now obtained in this way in several cases at a price ranging from $3.00 to $7.00 per car per day. The rate must vary necessarily on account of the varying conditions. A strong plea was made for the best possible construction. "There is no excuse now for electrical break downs; when such do happen, it is either from carelessness or cheap construction. Railroading is an exact business. The cars must be ready and go precisely on time. Delays in railroading are ruinous. All such can be avoided by good, honest work.

"There are 1,600 central electric light stations already located in this country, and some 425 railroad companies that sooner or later will have to have electric power. Is there any reason why you should not furnish it? Many a station has to stint and save to tide over the year's dull seasons. You have no day circuits, and are held by the sun to one schedule, and by the moon to another. Here is an opportunity for one more chance at profit. If necessary, enlarge the scope of your charters."

Prof. E. P. Roberts read a paper on "The Electrical Transmission of Power." A brief description was given of the electrical power plant at Virginia City, Nev., where the power generated by water under 1,680 ft. head is transmitted to the surface, the electric generators being driven at 900 revolutions per minute by Pelton water wheels, and the motors running at 850 revolutions. A similar plant of five motors is to be installed at the Calumet & Hecla copper mines. Professor Roberts gave a detailed description of the Brush motor, illustrated by diagrams. This paper closed the technical work of the convention, and before adjourning it was voted that the February meeting be held at Kansas City.

Sixty different firms were represented among the exhibitors. The extensive character of the exhibits at the last Chicago meeting led to their being discouraged at Niagara Falls on account of the expense incurred in preparations for them.

Paving New York Streets.

The last legislature of New York, it will be remembered, was so generous as to appropriate $3,000,000 (to be raised by the city of New York), for paving the streets of that city, the appropriation to be expended at the rate of $1,000,000 a year. Last Monday the Board of Estimate and Apportionment held a meeting, and made arrangements for spending $661,500 of the first million. The sum of $204,000 was appropriated for paving the Boulevard with asphalt on a concrete foundation. Resolutions were adopted in favor of a similar pavement in Lexington avenue, between Forty-second and Fifty-ninth streets, and in Broad street, between Wall street and Exchange Place; and as a matter of experiment, it was decided to cover the old pavement with asphalt in Park avenue, from Thirty-ninth to Fortieth street. It was further decided to lay pavements of granite blocks on concrete foundations in a number of streets of heavy traffic.

Permission was granted for the Commissioner of Public Works to appoint a special inspecting force, to consist of a consulting engineer, an assistant, 2 transitmen, 2 levelers, 4 rodmen, 1 draughtsman, 2 skilled laborers and 4 axemen; and the Comptroller was authorized to appoint an engineer to inspect the work before the contractors are paid.

New York is generally regarded as the worst paved city in the world. There seem to be two principal reasons for this: The work, though nominally under the charge of engineers, is in reality controlled by politicians, and the pavements are continually being torn up to lay and repair pipes and sewers, after which they can never be restored to their primitive condition without repairing the whole width of the streets where openings are made—even should the repaving of the cut be done in the most thorough manner, which, it is scarcely necessary to add, rarely if ever occurs. Hence the good citizens of the metropolis, who have no axes to grind, can scarcely be blamed for the apprehension that the money appropriated for pavements will be spent without much useful result. The use of asphalt, outside of the City of New York, has passed beyond the phase of an experiment, but that there is asphalt and asphalt; and if our rulers have decided that asphalt pavements are undesirable, as being cheaper in first cost and repairs, they can easily lay asphalt of such a quality and in such a manner as to make it a failure instead of a success. The noble Trojan who feared the Greeks even though they brought gifts, were he alive today, would probably express similar sentiments in regard to the present rulers of the City of New York.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Plain Tires, Frogs and Guard Rails.

The pernicious activity of the blind tire in tearing loose guard rails and frogs is again brought up, in a letter in another column, and some manifestations of it are made plain by the diagrams which A. D. B., the writer, has prepared. His chief complaint is that these tires are put nearer together than those with flanges. Apparently he is right in thinking that this is seldom necessary. The reason for putting plain-tired wheels closer together than those with tires is well known. The plain tire is used, of course, to obviate the binding of the flange against the rails on curves of small radius, when locomotives are used with three or more driving wheels on a side, coupled. It is very commonly used on mogul, consolidation and twelve-wheeled locomotives and sometimes on six-wheeled switchers working on sharp curves. But for this device, where the distance between centres of the first and last drivers is great, and the curvature considerable, the friction of the flanges of the intermediate drivers must greatly increase the resistance, and there must, moreover, be danger of spreading the rails. On a curve of 230 ft. radius (about 25 degrees) the versed sine for a chord of 15 ft., is nearly 1½ in.; that is, any point on the tread of the middle driver would be 1½ in. farther from the gauge line than corresponding points on the treads of the first and last drivers, supposing those to be 15 ft. centre to centre. When to this quantity is added the increased play given to the wheels between the rails by widening the gauge on curves, and from unknown irregularities of gauge, and the lateral motion within the machine itself, there comes in the danger that the plain-tired wheel may drop off the rail on a curve. To provide against this accident it is customary to make the plain tire broader than the flanged tire. For instance, on the Pennsylvania, with flanged tires 5¾ in. wide, the plain tire is 6½ in. The Schenectady standard tires are of the same dimensions, and in exceptional cases, for mountain roads with very sharp curves, tires 7½ in. wide are sometimes used. This increased width of plain tires is a precaution which no motive power department would be justified in neglecting, if its locomotives are to be run over sharp curves. It is the opinion, however, of some locomotive builders, the Baldwin Works, for example, that in most cases 6 in. is ample width for them.

The increased width of tire is often distributed equally on both sides of the centre line of tread, bringing the backs of the plain tires nearer together than the backs of those with flanges by the amount of the excess of width, as shown in the diagram with the communication from A. D. B. This, however, is by no means the universal practice. The Pennsylvania rule is to let the plain tire stand ¼ in. inside the flanged tire and project ¼ in. outside, making the distance between the backs of the plain tires ½ in. less than the standard. The Schenectady practice is to have the distance between the backs of wheels the same whether they have flanges or not. This arrangement would do away with the evil of which A. D. B. particularly complains, and would seem to be safe enough. At any rate, there is not the same reason for putting the extra width of the plain tire on the inside that there is for putting it on the outside. The liability of the wheel to drop off outside of the inner rail of a curve is not so great as that to come down inside the outer rail. In the first case, the inner face of the plain tire will run outside of the gauge line by the versed sine of the arc subtended by by the distance from centre to centre of the wheels on either side of it, plus any lateral motion of the parts, minus the thickness of the flanges. The last element would probably counter-balance the first in most cases, and the other would be too small to be of much importance in this connection. It could hardly happen that a wheel would go off in this direction unless on very sharp curves, combined with track or machinery in bad order. On the other hand, the curvature, loose gauge and all side play may operate together to let the outside edge of the wheel drop down within the outer rail. It follows, therefore, that if any part of the excess of width of the blind tire is put on the inside it should be considerably less than that part which is put on the outside.

This, however, only affects the relations of the guard rail and the blind tire. It will play its full part, along with the flanged driver, in destroying frogs however it is placed. When the point gets low, or the tread gets hollow, the overhang of the tire is bound to come in contact with the wing rail and cut it out and loosen it. The loosening of the guard rail is but one, and the least important, of the two forms of destructive action. The remedies for these evils are as well known as the evils themselves, but are sometimes forgotten and often neglected. In the first place the trackman (and we judge that A. D. B. writes from the trackman's stand point) has his duties, to keep guard rails and frogs level and well fastened. To this we might add the duty of reporting every driver with hollow tread that he sees. He may make a nuisance of himself, but at least he will have done what he can to save the property of the company. Indeed, we know of one general roadmaster who has tried to get authority to order into the shops any engines that he catches running over his frogs with double flanges. He has not yet succeeded, but he may sometime, for he is a resolute man, and will not let the track department be abused if he can help it.

The duty of the locomotive department is not only to promptly turn down tires that have worn hollow, but to prevent the necessity of turning them at all until the engines are taken in for general repairs. This last appears to be perfectly possible by the use of brake shoes of the Ross style. The brakes may be made to dress the tires very perfectly for a long time, and thus save much of the damage done to frogs and guard rails by "double flanges." One old locomotive builder writes: "Frogs, guard rails, blind tires and all have their defects or objections, but we can't do without them until something takes the place of railroads." To be sure, but we can save a good deal of money and trouble by looking about us a little and diligently using the faculties that the Lord has given us.

Train Dispatching on Double-Track Roads.

The typical modern American railroad is a long single track line, of wh ich we have hundreds of examples west of the Alleghenies and east of the Rocky Mountains. One of its prominent characteristics is the train-dispatcher system. Single-track roads in the east, being generally far less liberally supplied with magnificent distances, did not develop the science of moving trains by telegraphic orders as fully and as rapidly as was done by their Western contemporaries, and, population being denser, roads were converted from single to double track in the Eastern states faster than they were where there was more ground to cover and less money to cover it with. In operating double-track we are more in the position of imitators of the English, and cannot claim so much that is distinctly American. But even the prairie road of the west, with its long stretches between stations and its almost complete dependence upon the telegraph, has had to grow, and we now see hundreds of miles of double-track road in Ohio, Indiana, Michigan and Illinois.

This growth, however, has not always changed the methods of working, and there is a difference between Eastern double-track roads and those in the West. The typical Western road, like the Chicago, Burlington & Quincy, in adopting double-track rules, adhered to its old forms as far as possible. Although the necessity for making meeting points was removed, the dispatchers continued to keep track of the trains as closely as under single track conditions, and extras were allowed as little latitude as when it was necessary to guard them from numerous heavy and fast trains in both directions. On the other hand, a typical New England road, like the Boston & Albany, which never had to move heavy traffic over long stretch of single track, taking full advantage of the fact that a given track was used in only one direction, would run trains one after the other with as little respect for the dispatcher, almost, as prevails on the New York elevated, where the only rule is to keep off the heels of the train ahead. There being practically only two classes of trains, and, in normal working, the power to protect a train from collision (while at the same time it proceeded on its journey as fast as the engine could draw it) being within the control of the men on the train, the need of a train dispatcher was not recognized.

But no good reason exists for much difference, in this respect, in the manner of running trains on two double-track roads, and, as might be supposed, the methods in both cases were partly right and partly wrong. One road imposed upon its trains unnecessary delays from lack of close telegraphic supervision, while the other burdened its dispatchers with unnecessary work in giving orders to trains that might have taken care of themselves; and this introduced complications in various ways.

The Chicago, Burlington & Quincy now has two or more tracks all the way between Chicago and Burlington, 206 miles, and it has recently made a radical change in its running rules, which is the occasion of these reflections. The number of through freight trains shown on the time-table has been made very small, and all trains that it is necessary to run above this number (which have heretofore been run on dispatchers' orders as sections of the scheduled trains or as extras) are sent out by the yardmasters at the terminals whenever they may find it necessary or convenient, the rule to keep off the time of first class trains being respected, of course. The yardmasters at Aurora, Mendota and Galesburg have similar authority, and they can send out *any* extra train that may be found necessary. At all other points extras must move only on dispatchers' orders as heretofore. Work trains occupy the track without train orders, but must protect themselves *both ways*.

This is an eminently sensible move. A good rule for a dispatcher's office is to give the dispatchers as little routine work as possible, aside from keeping the record of trains actually running on the road. It is vitally important that everything they do be done thoughtfully and carefully; but the issuing of numerous orders every day for trains to make trips, which they could just as safely make without an order, has a tendency to weaken the dispatcher's resolution to make every move with deliberation. To deliberate where it is unnecessary to do so requires more rigid mental control than most men possess. Furthermore, the issuing of such orders must cause some delay in large and busy yards where the time consumed in making up trains varies greatly, and where the departure tracks are at uncertain distances from the telegraph office. The dispatcher, if not located on the spot, must generally suffer some little delay in getting his message sent, and he must, or should, make a careful examination of his train sheet and orders in force before starting the freight. On the other hand, if relieved of all this, he has the more time to attend to his legitimate duty of studying the chances of helping delayed trains. There is no danger of giving him too much time for this, provided he is only made to use it for the right purpose. On a double-track road the dispatcher should care little whether there are 10 freight trains or 100 running over his division until he desires to run a fast special train in among them, or has to make a section of single track. Then he needs positive and accurate knowledge of the whereabouts of every train; and this the Burlington provides for by maintaining the train-sheet the same as heretofore. To let the yardmaster report at some indefinite time afterward what trains he has sent out is always likely to involve annoying delays occasionally, if not actual risk, for operators will become careless in reporting trains if not held to strict account by the dispatcher. But with prompt reports from the yardmaster, of the departure of each train, and with the dispatcher at liberty to detect promptly any neglect of the operators in reporting every arrival and departure as soon as it occurs, the Burlington's new plan can doubtless be worked without delaying passenger trains or fast specials, while at the same time saving a great deal of time to the dispatchers and all concerned.

Northwestern Rates.

A new move in the rate game of the northwest has been taken. The Chicago, Burlington & Northern, followed by two other roads, has put in force a tariff of 15 cents, first class, between Chicago and St. Paul, applicable only to traffic originating at the seaboard or in the Middle States. This leaves the rate of 60 cents, first class, still in force on local shipments from Chicago to St. Paul. In our review of the Chicago & Northwestern report for the last fiscal year we drew the conclusion that this company was trying only to carry profitable business. In

line with this policy the Northwestern was in favor of reducing the St. Paul rate from 60 to 40 cents (first class), applying this to local and through alike. This meant the practical abandonment of the through traffic to the Lake Superior and Canadian lines, a loss to which the Burlington and the Kansas City roads could not submit.

The case will undoubtedly come sooner or later before the Inter-state Commerce Commission. The decision of the Commission in the case of the Chicago, St. Paul & Kansas City a year ago will be recalled. President Stickney based his defense on his right to charge more from Chicago to intermediate points than to St. Paul because the Burlington made unreasonably low rates. That case was not tried on its real merits, because only local shipments were referred to. No stress was laid on Canadian or Lake competition from the seaboard, and only the local situation was brought in question. But now the case is entirely altered by the application of low rates to seaboard traffic only. Through rates to Chicago of 75 cents, and to St. Paul of 85 cents, do not conflict with the law, and a local rate from Chicago of 60 cents comes without the short-haul prohibition. Can a rate be considered a through one when part of the line accepts an arbitrary sum? Precisely this question was brought before the Commission in the case of the Milwaukee Chamber of Commerce against the Flint & Pere Marquette, and the practice was held to be legitimate.

The real difficulty lies in the fact that this difference between a local and a proportion of a through rate is not merely a theoretical but a very practical matter. It is difference enough to destroy, in time, the jobbing trade of Chicago with the states of the Northwest, and the merchants of that city will leave no stone—legal or social—unturned to stop it. Already traffic men are anxious lest 15 cents should come to be accepted as the proportion west of Chicago on business through from the seaboard to the Missouri River cities. We all know how hard it will be to keep low rates in force to St. Paul only, and if the demoralization should spread to Missouri River traffic, the roads would be obliged, for self-protection, to treat it there, as now to Minnesota, as applicable only to seaboard traffic, leaving locals as at present or but slightly reduced. This would make Chicago a "way station," about which the Western papers so often speak. Such a calamity we may be sure will be resisted with all the city's strength, and that is very great. In this grave problem we feel at once the bad influence exerted by unnecessary railroads. The Chicago, Burlington & Northern seems to have been built in retaliation for the Chicago, Milwaukee & St. Paul's line to Kansas City. Neither of them was needed, and both are now complicating the situation, for both, especially the Burlington, must get some traffic, no matter at whose expense and at any cost to others.

The problem before the merchants of Chicago will probably now take definite shape. They are already asking for a reduction of locals, and may bring an action on this very ground of too large a difference. On this point there are no precedents wholly applicable, and what the Commission would say is a matter of conjecture. In the common courts, however, Chicago has a strong position. The Hannibal decision, that 12 cents was too great a difference between local and through, is much in Chicago's favor, for a home jury would very likely bring in a verdict that even this amount was too much on St. Paul traffic. For the Northwestern roads whose prosperity depends on through freight, the outlook is most serious. The outcome seems likely to be either an abandonment of the through (seaboard) traffic to and from the northwest, or a reduction of local rates nearly to the level of the through. In the long run it will be difficult to avoid the latter alternative in any event, and the competing lines are so close together that the weaker are sure to hurt the stronger, notwithstanding the fact that the latter are gradually approaching an acceptance of the inevitable.

Claim Department Rules.

The Southern Railway and Steamship Association has issued a revised code of rules governing the settlement of freight claims in the territory of the association. In general it may be said that they are wise and conservative, but as must happen when principles are crystalized into concrete statements to be put in force in practice, there will be blunt rules covering points which are disputed. Rule 1 provides that all claims shall be presented to delivering road, a rule which can never be enforced legally or commercially. The only exception made in the rule is when goods are totally destroyed; but we do not see the distinction. If the law that the consignee is the real owner is relied upon, it is applicable to shipments wholly or partly destroyed. Influence should be exercised to have claims presented by the consignee, but an absolute rule which must be broken is of questionable use. Several rules follow which are of universal acceptance, such as basing payment upon invoice cost and requiring original bill of lading and expense bill. We say universal acceptance, because experienced business men have come to put up with these rules; but requiring surrender of the bill of lading and expense bill for several months (or even for any length of time) is illogical, and is one more straw which helps customers to nurse ill feeling against a road. The rational view is that a road knows what papers it has issued to consignor and consignee, and should be content to enter upon such papers, *at the time of payment*, any memorandum necessary to provide against future fraud. To demand possession of original papers belonging to the customer is simply asking to be "humored" in clumsy business methods.

Rule 4 declines claims for robbery unless packages bear evidence of having been opened, or unless there is internal evidence, such as displacement of contents. Liquor shortages are fruitful sources of trouble, and employés of both merchants and railroads, show great ingenuity in abstracting contents and replacing covers, or boring gimlet holes in whisky barrels where the hoops have been, and replacing the hoops. We suggest the propriety of demanding the sealing, by wire, of wine cases, the same as now for cigars. Rule 6 allows intermediate roads to raise freight charges where the shipper has given a release, but the initial road fails to note the fact on way bill. The initial road must pay this overcharge. Under rule 7 a delivering road can call a "board of survey," itself having a representative thereon, which board shall go into the whole matter, expense to be added to claim. Rule 8 follows custom in demanding full reports of damages instead of the common "B. O.," "part contents gone," etc. Very proper rules are given for cleaning cars and for separation of acids and the like. Some Eastern roads load "wet cars," in which are put all goods likely to leak and injure valuable cases, which is a good idea. Seal records must be carefully and fully kept.

Rule 14 provides that when shortages occur under initial seals and count at both ends is verified, claims shall be prorated on basis of revenue earned. This is a point much disputed. We recall a number of cases which were much discussed when carloads of tea from San Francisco to Chicago and New York showed shortages at destination under original seals. Intermediate roads declined to prorate on the ground that it was a matter between loading and receiving stations with which they were not concerned; if they must participate in losses of this kind the whole system of sealing was of no value as evidence. But these roads afterward abandoned this position and paid their share in order to have a clearly defined system, under which they would gain as much as they lost, in money, and there would be an added gain to all concerned in ease and expense of handling claims. Rule 15 seems to be unfavorable to joint agencies at connecting points as unsatisfactory to both roads, more trouble than saving arising from it even in the matter of recording seals of cars. Rule 19 provides for prompt report of any shipment where consignee cannot be found, a repeated report in two days, and a compliance in five days with the law of the state regarding public sale. Damages arising from leaking roofs and the like shall be prorated.

Rule 25 is important. "All claims for overcharges based upon bills of lading agreeing with established tariffs, *shall be paid upon presentation by claimants without a reference for authority.*" We heartily commend this action of the Southern association. We believe it is not only just in itself but is wise as a matter of policy. Claims which are clearly right should be paid at once upon presentation of papers by claimant. More effort in this direction would greatly help to remove the friction between shippers and carriers, and would have a good effect upon proposed adverse state legislation. Rule 28 applies the same principle to overcharges in weight. Claims arising from errors of agents or employés shall be charged to the road employing the person at fault. Rule 38 establishes a Court of Claims, which shall consist of the Rate Committee of the Association and its General Claim Agent. Each member shall vote upon claims after investigation and submission of report of the General Claim Agent. Their decision shall be binding, and as a court they may be called together at any time by their Chairman, Commissioner Thomas H. Carter. Expenses will be prorated on revenue basis upon roads interested. The Claim Court shall also prorate judgments obtained through law courts if the latter fail to locate the liability.

Bills of Lading as Conclusive Evidence.

By a decision quoted in our Railroad Law column, it is again affirmed by the Supreme Court of the United States that carriers are not responsible for bills of lading representing property which has never been received by the railroad. (Price vs. Denver & Rio Grande, 21 Pac. Rep., 188.) After these repeated decisions of the highest court in the land, and despite a decision to the contrary under somewhat different circumstances by the New York Court of Appeals, the law may be regarded settled that a railroad agent has no legal authority to bind his company by issuing fraudulent receipts. He is employed by the company for certain special duties, and anything outside those duties is *ultra vires*, beyond his power, because he is told by his employer to receipt for property actually received only.

Two years ago a determined effort was made to have Congress pass a law declaring bills of lading conclusive evidence under all circumstances. Such a revolutionary measure did get through the House, but was killed in the Senate. It was said, and justly, that fraud vitiated all contracts, and that bills of lading should not be made an exception. That merchants and bankers handled commercial notes of indebtedness carefully and relied upon the man more than on the paper, and that anybody paying out money on bills of lading should use the same caution that they habitually exercised in other money matters, and finally that if such a law was passed, collusion between a number of freight agents could produce a lot of forged bills of lading amounting to more money than the road's mortgaged debt, the end of which would be certain bankruptcy. These views prevailed and the proposed bill did not become a law.

On the other hand, the public who deal in bills of lading, as being titles to cotton and grain and securities for drafts, while admitting all the above, still think that the present situation is not a fair one. Bills of lading have become indispensible under our modern commercial system, and it is no longer possible to follow back each individual one; the system itself should be protected. Probably 90 per cent. of our grain and cotton moves under bills of lading made out "to order," and transferred from hand to hand or bank to bank as titles to the shipments. Any serious fraud upon the merchant or banker, if allowed to pass without cure, throws all business into confusion.

How these diverging views are to be reconciled does not clearly appear. One proposition is to have bills of lading endorsed on demand by some specially designated officer (say the general freight agent), a small fee perhaps being charged and time allowed for investigation; such indorsement to be binding upon the railroad absolutely. The present system could, without interfering, be continued for those who did not wish to spend time and money for absolute security. These suggestions are thrown out for consideration by traffic officers, for in case of any demand for secure bills of lading on the part of the mercantile public, a railroad ought to have a plan ready which should be fair to the carriers and at the same time just to the shippers. This is particularly demanded since, by resolution of the Traffic Associations, the roads are limiting the negotiability of ordinary bills of lading. It would be all the fairer to find some means of protecting those intended to be negotiable.

The recent race between the large ocean steamers City of New York and Teutonic resulted in the victory of the former by 33 minutes; the course sailed by the City of New York being 10 knots longer (requiring about half an hour additional time) than that of the Teutonic. The Tuetonic's voyage, while a successful one for a maiden trip (6 days, 14 hours and 33 minutes, from Roche's Point to Sandy Hook), does not break the record for first trips, having been surpassed by the first voyage of the Columbia. It is possible that the foggy weather encountered by the Teutonic is mainly responsible for this, as it was necessary to slacken the engines on several occasions. The daily runs of the Teutonic were, respectively, 394, 404, 430, 431, 440, 454 and 227 knots, or 2,780 knots in all, giving an average speed of 17.53 knots per hour.

This elegant vessel was thrown open to public inspection last Monday, and was visited by a large number of sightseers who willingly paid 25 cents each for the privilege of examining the longest steamer afloat. The Teutonic is subsidized by the British Government at the rate of £15,000 a year, for which payment the steamship company agrees to hire or sell the vessel to the government in case of war. Passenger steamers thus subsidized are required to be built after plans approved by the British Admiralty, their structural strength being increased so that they can carry guns. The Teutonic is designed for a battery of twelve 33-pounder rapid firing guns, four on each side, two on the bow and two at the stern. The platforms for the bow and stern guns are the only ones in place at present, and the guns are stored at an English dockyard, ready for use. These guns were mounted recently when the Teutonic took part in the naval review off Spithead. The platforms for the broadside guns could be put in place at short notice, the frames for their reception being built into the hull.

The length of the Teutonic is 582 ft., the beam is 57½ ft. and the depth of hold 39½ ft. The registered tonnage is 4 244, and the gross tonnage 9,685. The engines, built by Harland & Wolff, of Belfast, are of the triple expansion type, with piston valves, the diameters of the cylinders (of which there are two sets, for the twin screws) being 43, 68 and 120 in., with a stroke of 5 ft. There are 12 boilers, 72 furnaces and 1,163 sq. ft. of grate surface, the working pressure being 180 lbs. per sq. in., and the indicated horsepower of the engines 17,000.

The screw propellers are 21½ ft. in diameter, with a pitch of 28½ ft., and this arrangement is somewhat unusual. The distance between centres of the propeller shafts is 16 ft., so that each propeller overlaps the other 2¾ ft., and the propeller on the port side is set 6 ft. in front of the starboard propeller. The starboard propeller is right handed and the port propeller is left-handed, the former working in the water set in motion by the port propeller, and revolving a little faster (about two revolutions a minute). This arrangement, it is supposed, secures smoother working of the propellers and increased efficiency. As it is something of an experiment, time will be required to determine its value. The idea is not altogether novel, having been proposed by David Napier in 1841 and by Edward John Carpenter in 1850. Several other patents for essentially the same device have also been granted, and the reader who is interested in the subject will find brief notices in Bourne's "Treatise on the Screw Propeller."

The Haymarket Square passenger station of the Boston & Maine, in Boston, is to be abandoned, according to news items which appear in the Boston papers. The road has secured a right to enlarge its structure on which tracks are built over a portion of the Charles River, and trains will be

run from the old Boston & Maine on to the tracks of the Eastern at East Somerville, about 3 miles out, and from these tracks a connection will be made, so that trains can enter the station of the Boston & Lowell road. As most of our readers know, the Lowell, Eastern and Boston & Maine stations are very close together, and, in consequence of leases, are now all under the control of the Boston & Maine. The Haymarket Square station is two blocks further back from the river than the other two and its discontinuance will therefore effect the abolition of two very bad grade crossings. It is stated that the Lowell station can be enlarged by utilizing the wings which are now used for carriage stands and other purposes. Doubtless this enlargement will be in the nature of a makeshift, and a large increase in the number of trains using the station must cause considerable crowding; but the evils of the Traverse street and Causeway street crossings are so great that the change will doubtless be a marked public benefit, even when made at the expense of pretty severe crowding of trains. The scheme for erecting a large new union station for the use of all roads entering Boston from the north, which has been under consideration for several years, seems to be no nearer solution than ever; but even if it were to be put in process of execution this year its completion would be from one to three years off, and the relief of the public at the grade crossings for that length of time is a substantial advantage.

The recent discussions concerning transcontinental traffic have brought out the statement, made in various forms, that the Pacific Mail Steamship Company receives a subsidy from "the Pacific railroads." The president of the steamship company wants the matter referred to as a contract for the "rental of space" on the steamers by the railroads. In continuing this long-standing arrangement, the railroads are probably not violating that provision of the Inter-state Commerce law, which prohibits "pooling of freights of different and competing railroads," nor that which makes it unlawful to divide earnings between them; but they would seem to be not far from it. It is apparently not unlawful for a railroad to pool with the Pacific Mail unless the Panama railroad be regarded as something more than a transfer wagon between two steamers, and there is no violation of the letter of the law in an agreement by competing railroads to participate jointly in a sum to be paid out; but if two or more roads join in "renting space," as here described, it would seem to come about as near to pooling as anything can and still be something else. On what basis are the shares to be paid by the several roads apportioned? The monopoly-bating legislator must have been napping, or, perhaps, intently gazing upon Canada, when he allowed such work as this to go unnoticed.

The by-laws of the Pennsylvania Railroad Relief Department provide that at the end of three years—that is, at the end of 1888—the question of a superannuation fund shall be considered, provided there be a surplus sufficient to make such a plan possible. The surplus last January was over $170,000, and it is now announced in the Philadelphia *Record* that the Advisory Committee will before long promulgate a plan for a regular system of pensions for superannuated members of the Relief Fund. It will be remembered that the surplus of this department is just about equal to the amount paid for running expenses during its three years' existence, and that this amount has come wholly from the treasury of the railroad company. In other words, the assessments are placed at such a rate that they would have just fairly sustained the institution. The interest on $170,000 at four per cent. is $6,800 per year, sufficient to pay, say, 20 pensions of about $30 per month each. It would seem best to accumulate a larger fund before beginning to pay out; the number of probable pensioners among 20,000 members is many times 20.

A correspondent writes to us, stating that he has experienced trouble with the water gauge on his boiler; the feed water containing so many impurities that the passages of the connections between boiler and gauge are frequently clogged, and can only be cleaned by unscrewing the fittings and inserting a wire in the clogged passage. It is not generally supposed that these passages will become clogged, if ordinary care is used, and the gauge is blown out once or twice a day; and if any other of our readers have experienced trouble of this kind, we would be glad to hear from them.

NEW PUBLICATIONS.

Practical Iron Founding. By the author of "Pattern Making," etc. New York: D. Van Nostrand Co., 1889. 12mo., pp. 213.

This little treatise, written by a practical man, who has evidently worked with his head as well as with his hands, seeking the reasons and principles on which different methods depend, gives a fair idea of sand, loam and machine molding, with good illustrations and descriptions of the tools and apparatus employed. There are also descriptions and illustrations of cupolas, methods of producing blast, and discussions of the qualities of different varieties of cast iron.

Practical Blacksmithing, Vol. I. Compiled and Edited by M. T. Richardson. New York: M. T. Richardson, 1888. 12mo., pp. xxii., 224; price, $1.

Should this little work meet with a ready sale, there seems to be no reason why additional volumes should not be issued without limit, because an editor who merely makes a collection of articles which have appeared in technical journals, not even taking the trouble to classify them, and assuming no responsibility for their accuracy, need never be at a loss for material. The editor expressly states in his preface that he "does not hold himself responsible for the subject matter, or the treatment which each tool receives at the hands of its author. There may be, sometimes, a better way of doing a job than the one described herein, but it is believed that the average blacksmith may obtain much information from these pages, even if occasionally some of the methods given are inferior to those with which he is familiar."

The editor deserves credit for his selection of material, and with few exceptions might recommend all the articles unqualifiedly. The articles are mainly by practical workers, who tell how they arrange their shops, build their forges and chimneys, etc.; what kind of tools they use, and the like. The present volume refers almost exclusively to the plant of a blacksmith shop, and it is to be hoped that the editor will continue his compilation, extending it to explanations of how this plant is to be used, with articles on tempering, hardening, welding, etc.

Although the classification of the different articles leaves much to be desired, there is a good index which facilitates reference.

The World's Fair.

The cities which are willing to assume the responsibility of conducting an international exhibition in 1892 accuse New York of being impulsive, but not steadfast; enthusiastic at the inception of an enterprise, but quickly assuming a calm and indifferent state as soon as the real difficulties present themselves. It is perhaps too early to decide whether this accusation is justified in the case of the proposed exhibition; but so far as signs go, the enthusiasm seems to be rather on the increase. The Committee on Finance had a meeting last Tuesday, 18 of the 25 members being present, many of them having come from a distance to attend, and it was well remarked that rarely has so much wealth been concentrated in a single room. The committee organized by selecting Mr. Samuel D. Babcock for Chairman and Mr. J. Edward Simmons for Treasurer, the choice of a secretary being left to the Executive Committee, which was appointed by the Chairman as follows: Messrs. August Belmont, John H. Inman, Cornelius Vanderbilt, J. Pierpont Morgan (afterwards chosen Chairman of the committee) and Charles C. Smith; the chairman and treasurer of the whole committee being added to the above. It was suggested that each member of the committee should subscribe $100 for preliminary expenses, when Mr. Babcock remarked that the sum of $10,000 had been contributed for this purpose. Numerous tenders of offices, free of rent, were made, and Mr. Seligman submitted a plan for raising $15,000,000, by organizing an exhibition company and issuing stock, the interest on which should be guaranteed by the city of New York. Although this seems to be forbidden by the Constitution of the state of New York, the plan was referred to the Executive Committee.

The Executive Committee held a meeting on Wednesday morning in the rooms of the Chamber of Commerce. A letter was received from Edward Atkinson, recommending that the exhibition should have for its motive "The progress in human welfare in 400 years, through the application of science and invention to the pursuits of peace." Some 40 plans for raising money, which had been sent to the Mayor, were divided among the different members of the committee, who decided that they would carefully examine all these schemes before submitting a plan of their own. The correspondents who offer advice gratuitously have been as busy as ever during the past week, and the Mayor stated that he would turn over all the letters to the Executive Committee as soon as they had selected permanent quarters.

The *Herald* has put the choice of a site to a popular vote, and for a week has been publishing the names and addresses of correspondents, with their preferences. On Wednesday, the vote, with the exception of a few scattering selections, stood as follows:

Central Park	758
Van Courtlandt Park	184
Port Morris	180
Washington Heights	48
Staten Island	40
Pelham Bay Park	31

Although all the daily papers, the *Herald* included, agree that the selection of Central Park for the site would raise so much indignation as probably to kill the exhibition, the votes for that locality are more numerous every day than those for any other site. Aside from this, the popular choice seems to be nearly equally divided between Van Courtlandt Park and Port Morris. The latter is the location advocated by Messrs. North and Croes, and referred to in these columns Aug. 9.

TECHNICAL.

Locomotive Building.

The contract for the 56 new locomotives, for which, as we stated July 26 the New York Central & Hudson River road was asking bids for building, have been awarded to the following companies: 10 to the Brooks Locomotive Works, Dunkirk, N. Y.; 22 to the New York Locomotive Works, Rome, N. Y.; and 24 to the Schenectady Locomotive Works, Schenectady, N. Y.

The Chesapeake & Ohio has ordered several ten-wheel passenger engines of the same pattern as several recently built by the Baldwin Locomotive Works for the New York, Lake Erie & Western.

The Pittsburgh Locomotive Co.'s shops are running 13 hours a day, completing orders. The company received an order from a Western road last week for 10 heavy engines similar to several which it recently completed for the St. Louis, Vandalia & Terre Haute.

The Fort Wayne, Cincinnati & Louisville has received from the Baldwin Locomotive Works two 45-ton freight engines.

The Baldwin Locomotive Works have an order for 30 locomotives from the Rio Grande Western Road, and the New York Locomotive Works are building four for the same road.

The Pennsylvania shops at Altoona, Pa., have received an order for 17 locomotives of Class P pattern for the New Jersey division, and also an order for 15 Class O locomotives.

Car Notes.

The Deseronto Car Works, of Deseronto, Ont., have just finished the construction of 235 freight cars for the Canadian Pacific and the Canada Atlantic. The works are now busy on cars for the Napanee, Tamworth & Quebec Road.

The Lafayette Car Works, of Layfayette, Ind., have recently been awarded contracts for 500 box cars by the Pennsylvania, and for 100 furniture cars by the Northern Pacific.

The Pullman Car Company is building for the Louisville, New Albany & Chicago two complete trains, which are to be put on to run between Chicago and Cincinnati via Indianapolis.

The Indianapolis Car Mfg. Co. has been awarded the contract to build 500 box cars for the Missouri, Kansas & Texas road.

Within the past five months the Union Pacific road has added to its equipment over 4,000 cars, and is contemplating the purchase of still more.

The Cincinnati, Hamilton & Dayton has placed a contract with the Lima Car Works, of Lima, O., for repairing several hundred cars and casting a large number of wheels.

The Cleveland, Cincinnati, Chicago & St. Louis has contracted for 4 complete passenger trains, which are to be put on and run as limited trains between St. Louis and New York City. The sleeping coaches will be built at the Wagner Car Works, and will be completed by Oct. 15.

The Toledo, St. Louis & Kansas City road having been made standard gauge, has 600 freight cars, 11 passenger cars and 11 locomotives of narrow gauge width which it offers for sale.

The Rio Grande Western has let contracts for 30 passenger and baggage cars to the St. Charles Car Co., of St. Charles, Mo., and for 500 stock, gondola, coal, box and flat cars with Wells & French Co., of Chicago, and the Litchfield Car Co., of Litchfield, Ill.

The Terre Haute Car & Mfg. Co., of Terre Haute, Ind., is building 50 furniture cars for the St. Louis, Vandalia & Terre Haute.

The Pennsylvania has, it is announced, decided to increase its equipment by 6,000 freight cars, instead of 3,000, as recently announced.

The Ohio Falls Car Works, at Jeffersonville, Ind., have secured a contract to construct 500 freight cars for the Pennsylvania Company, and have sold 50 box cars to the New Orleans, Fort Jackson & Grand Island road, and 50 gondolas to the Birmingham, Sheffield & Tennessee River.

Bridge Notes.

The wooden bridges on the Chattanooga division of the Nashville, Chattanooga & St. Louis have been replaced by iron structures, and the work of substituting iron for wood on the Hickman division has been commenced. Four of the Harpeth River bridges will be changed this summer. The principal bridge on the Lebanon branch, burned last spring, will also be replaced by an iron structure.

The R. F. Hawkins Iron Works, of Springfield, Mass., has secured the contract for the iron highway bridge, to be built in New Bedford, Mass., over the Acusnet River. There were eleven bidders. The bid of the R. F. Hawkins Iron Works, $19,000 for the superstructure, was the lowest received.

The Berlin Bridge Co., of East Berlin, Conn., has the contract for building a railroad bridge over Ausable Chasm, N. Y. The bridge will be 123 ft. above the river and 200 ft. long.

The King Iron Bridge & Mfg. Co., of Cleveland, has the contract to build a combination bridge across the Redwood River, at Redwood Falls, Minn., for $1 000.

The bridge across the bay to connect Belleville, Ont., with Prince Edward county, is now under construction, under direction of C. H. Keefer, of Toronto. The total length of bridge and approaches is 5,600 ft., steel superstructure with masonry piers and abutments. It is a low level bridge with 16 fixed spans, and one draw span in the steamer channel 240 ft. over all, giving two openings of a little over 100 ft. each.

The County Commissioners have awarded the contract for the Bloomington street bridge at St. Paul, Minn., to the Wisconsin Bridge Co. at $8,942.

The Lake Erie & Western has closed a contract for three iron bridges, one to be placed over White river near Muncie, Ind., another near Lima, O., and a third at Buckland, O.

The Groton Bridge & Manufacturing Co., of Groton, N. Y., has the contract to build the iron superstructure of a bridge over the Passiac river at Rutherford, N. J.

The County Commissioners have awarded the contract for building a 100 ft. iron bridge across the Vermilion River, in the southeast portion of Huron County, O., to the Wrought Iron Bridge Co., of Canton, for $1,940. This company has also received the contract for an iron bridge at Elm Point, St. Charles, Mo.

The following bridges are to be built in Wadena County, Minn: One combination bridge, 48 ft. clear span, 14 ft. roadway, 8,000 lbs. capacity; two iron bridges, 24 ft. clear span. Contracts will be let by John Barber, Wadena, Minn.

A charter is to be applied for shortly for the Homestead Bridge Co., to build a bridge from Homestead, Pa., to the north side of the Monongahela River. The incorporators are Harry Brown, E. M. O'Neill, Charles E. Speer, Samuel S. Brown, W. W. Burchfield and James S. Kuhn, of McKeesport, Pa. The capital is $30,000.

It is proposed to build an iron bridge across the Minnesota River between Renville and Redwood counties, at Sacred Heart, Minn.

The City Engineer of Toronto, Ont., has presented plans and estimates for new bridges, as follows: Dundas street bridge, $81,000 and $75,000, including bridge, grading, land, etc.; College street bridge, $38,000.

The King iron Bridge Co. has received the contract, at $1,850, for the iron bridge over Opequon Creek, at Charleston, W. Va. There were four bidders.

The iron bridge over Cherry Creek, at Larimer street, Denver, Col., mentioned last week, will be built according to Theodore Cooper's specifications, and will have three trusses and two roadways, the trusses to be 24 ft. apart from centre to centre, with 18 ft. clear headway. There are two footwalks, each 10 ft. wide.

Hathaway & Co., of Philadelphia, were the successful bidders for the iron superstructure of the bridge at Seventh street, Chester, Pa. Their bid was $12,995. The other bids were: Dean & Westbrooke, $13,500; Levering & Garrigues, $15.525; Penn Bridge Co., $15,400; W. F. Hawkins, $13,700; Cofrode & Saylor, $14,000.

The following bids for constructing an iron roadway viaduct at Union avenue, Pueblo, Col., 400 ft. long, 40 ft. wide, were received: Chicago Forge & Bolt Co., Chicago $33,000; Lane Bridge & Iron Works, Chicago (without hand rail), $29,902; Kansas City Bridge & Iron Works, Kansas City (without hand rail), $35,000; Cofrode & Saylor, Pottstown, Pa., delivered at Pueblo, $27,800; King Iron Bridge & Mfg. Co., Cleveland, O., $34 000; George E King Bridge Co., Des Moines, Iowa, $35,000; Missouri Valley Bridge & Iron Works, Leavenworth, $35,000; Cofrode & Evans, Pottstown, Pa., $34,200; Edge Moor Bridge Works, Wilmington, Del., $34,000; New Jersey Steel & Iron Co., Trenton, N. J., $34,613; Pittsburgh Bridge Co., Pittsburgh, Pa., $33,500; Wrought Iron Bridge Co., Canton, O., $34,000.

A company with a capital stock of $2,000,000 has filed articles of incorporation in Oregon to construct a bridge across the Columbia River at a point near Vancouver, Wash. Ter., 10 miles below Portland.

The Union Bridge Co. has given out the contract for the lumber and the false work for the superstructure of the Merchants' Terminal bridge at St. Louis, Mo. On Sept. 2 the contract for the southwestern approaches of the bridge will be given out by the Terminal Co. The work upon Pier No. 2 has progressed yesterday within 3 ft. of its resting place. Mr. S. V. Ryland will superintend the erection of the bridge.

The Commissioners of King County, W. T., received three bids for the construction of the big bridge at Snoqualmie: T. G. Bird, 196-ft. span, $7,700; approach, $3.60 per lineal ft. Hoffman & Bates, 180-ft. span, iron piers, $6,590; approach, $3 per ft. San Francisco Bridge Co., 180-ft. span, $6,933; approach, $3.85 per ft. The contract was not awarded, the bids being taken under advisement.

The Commissioners of Chehalis County, W. T., have let the contract to Hoffman & Bates, of Portland, for a new bridge on the Klickitat road. It will have a main span of 135 ft., and cost $2,980.

Manufacturing and Business.

C. G. Dyott and E. B. Williams recently organized an equipment company under the firm name of Dyott & Co., with office at 52 William street, New York City. The firm will undertake to negotiate new railroad securities, accept contracts for general railroad work, supply rolling stock, and supplies of every description, including locomotives, cars, rails, fastenings, spikes, frogs, switches, etc., and also purchase these articles from railroads and others. The firm has been appointed direct representatives of several railroad supply manufacturers.

The Armington & Sims Co., of Providence, R. I., has arranged with the Canadian Locomotive & Engine Co., of Kingston, Ont., for that company to have entire sales and exclusive rights to manufacture the Armington & Sims engines in Canada. The Canadian Company has been re-organized under the management of Dubs & Co., the celebrated firm of locomotive engineers in Glasgow, Scotland. M. W. Lorimer will be Managing Director, and F. J. Leigh, Superintendent.

The Atchison, Topeka & Santa Fe has recently placed some large orders with the Scarritt Car Chair Co., of St. Louis, for its No. 55 iron reclining chair. A large shipment has just been made and the rest of the order will go forward soon.

The Thomson-Houston Electric Co., were the lowest bidders for installing incandescent electric light plants on board the United States ships "Petrel" at Norfolk, Va., and the "Vesuvius" at the New York navy yard, and will probably secure the contract.

Colby & Weiskaff, civil and mechanical engineers, of Pittsburgh, will do the engineering work for both the Dravosburg & Reynoldton and the McKeesport & Duquesne bridges, to be built across the Monongahela River.

The Novelty Steel Wheel Co., of McKeesport, Pa., expects to be able to make wheels to fill orders by Sept. 10. The first wheels which were made at the company's plant will be placed on exhibit at the Pittsburgh Exhibition soon to open.

Iron and Steel.

The new puddle mill of the Ellis & Lessig Steel Iron Co., at Pottstown, Pa., just completed, was put in operation Aug. 14. There are 12 new furnaces, which will employ nearly 150 additional workmen when in full operation. The old mill had eight puddles and the entire mill now has 20 furnaces.

Riter & Conley have received the contracts to build the two new furnaces for Carnegie, which when finished will be the largest in the world. They will be 10 ft. higher than any now in existence. This firm also has the contract for the building and boilers of the big extension to their works which the Wheeling Iron & Steel Co. is making.

The Thomas Iron Co., of Hokendauqua, Pa., has effected a radical change in the management of its furnaces which has produced a decided alteration in the character of the product. The company has increased the output of soft or foundry iron grades over 50 per cent. as compared with the former record.

Work has been suspended at the Ferndale Car Wheel & Axle Works at Allentown, Pa., as all orders on hand have been filled. A large number of men are thrown out of employment, but it is thought the works will resume soon.

The American Tube & Iron Co., Youngstown, O., has secured a contract for 70 miles of wrought-iron pipe from the Columbus (Ohio) Natural Gas Co. The contract amounts to $500,000.

The forging department of the ordnance plant of the Bethlehem Iron Co. last week completed a heavy casting for the new ordnance plant weighing 95 tons, the metal for which was procured from the cupolas in the Bessemer plant. The large compressor recently completed, probably the largest in the country, is now in operation and works satisfactorily.

Bids were opened for cast-iron gas-pipe at Hamilton, O., Aug. 7, by the gas-works trustees. The following manufacturers put in bids: The Jackson & Woodin Mfg. Co., of Berwick, Pa.; Dennis Long & Co., of Louisville, Ky.; the Ohio Pipe Co., of Columbus, O., and the Addyston Steel & Pipe Co., of Cincinnati. The contract was awarded to the Addyston Steel & Pipe Co. at the following rates: 12 in. pipe, $22.75 per ton of 2,000 lbs.; 8-in., $26.75; 6-in., $26.75; 4-in., $28.75; special castings, $2\frac{1}{10}$ cents per lb.

The Boulton ingot-casting apparatus was erected at the works of Singer, Nimick & Co., Limited, at Pittsburgh, on an arrangement with the Solid Ingot Co., of Newark, N. J., for a 30-day test. The test was completed last week without a single failure from first to last, and the apparatus has been accepted.

The Gautier Steel Mills at Johnstown, Pa., have several trains of rolls about ready to start, and in a short time considerable work will be done. An immense pile of iron and machinery is lying on the site of the mills, and it will be some time before it is all removed. The question of the permanent location of the mills has not yet been determined, but it is thought they will be located in Conemaugh borough.

The Raney & Berger Iron Company, of New Castle, Pa., has been chartered with a capital of $200,000. The directors are Leander Raney, George B. Berger, W. T. Dougherty and George W. Hartman, of New Castle; James A. Raney, of Mahoningtown, and Alexander A. Patterson, of Pittsburgh.

Furnace F., erected by Carnegie, Bros. & Co., in 1886, burned out at the top last week and was damped down for repairs. It has since been found necessary to blow the furnace out as it will have to be re-lined. This furnace was put in blast Oct. 18, 1886, and since that time it has been stopped twice on account of strikes, and has produced 224,795 tons of pig iron.

Charles Bingen, proprietor of the Cyclops Steel Works, at Titusville, Pa., has just added to the works a four-hole six-pot Siemens steel-melting furnace, and also a new melting house. Additions have also been made to the hammer department, and others are contemplated in the near future.

The Illinois Steel Co., of Chicago, has leased the Mayville Furnace, at Mayville, Wis., from the Northwestern Iron Co. The furnace is out of blast, but it is the intention of the lessees to blow it in as soon as possible. Its capacity is about 1,500 tons a month, and it may be utilized for either foundry or Bessemer iron.

The Moorehead-McCleane Co., proprietors of the Sobo Iron and Steel Works, at Pittsburgh, is altering the old armor plate mill, and expects to have it in readiness for work by Nov. 1 next. With the improvements completed, the firm will be able to roll plates about 90 in. wide, as light as $\frac{1}{4}$ to $\frac{5}{8}$ in., and of any length, in either iron or steel.

The first cast of open-hearth steel was made at the Latrobe Steel Works, Latrobe, Pa., Aug. 7, one of the 15-ton furnaces having been completed. Another furnace of the same size will be completed soon. This is wholly a new plant, its erection having been commenced in 1888. The product of the open-hearth plant will be rolled into tires for locomotive and car wheels. The branch office of the works is at No. 251 South Fourth street, Philadelphia. The officers are: Marriott C. Smyth, President; Walter H Bryant, Secretary; Ellwood W. Kumber, Treasurer; Guilliaem Aertsen, Manager; Julian Kennedy, Chief Engineer, and J. K. Griffith, Superintendent.

New Shops and Stations.

The Grand Trunk will shortly commence the construction of a new station at St. Johns, Quebec.

The Mexican National will have its large car works and machine shops at Laredo, Tex., completed within 60 days. The buildings are constructed of Laredo brick, with iron truss roofs. The total cost of this plant will be over $600,000, and it can employ over 1,000 workmen. On the completion of these machine shops the machinery now in the shops at Corpus Christi, Tex., and New Laredo, Mexico, will be removed to Laredo. It is the intention of the company to concentrate in that city the entire work of its system.

Mr. Van Horne, President of the Canadian Pacific Road, stated in Montreal last week that the company had decided to erect a new station and extensive repair shops at London, Ont., for the division between Toronto and Detroit. The city of London has pledged itself to a bonus of $25,000 on condition that the shops be erected there.

A press despatch from St. Joseph, Mo., states that the Chicago, St. Paul & Kansas City will expend $250,000 in building in that city by next spring. Additions to the present buildings will be made, and extensive shops will be constructed. The general machine and repair shops of the company are to be located in St. Joseph.

The machine shops of the New Orleans & Northeastern Railroad, at Meridian, Miss., are to be enlarged by the erection of a two-story brick building, to contain machinery for car-building and a paint-shop.

Rolling Rails Direct from the Molten Metal.

A machine, designed and patented by Messrs. Edwin Norton and John G. Hodgson, of Maywood, Ill., for rolling rails and other shapes direct from the molten metal, is illustrated in recent numbers of the *Iron Age* and the *American Machinist*. This machine is in direct extension of the Norton process for rolling thin sheets of solder from molten metal, which is now in successful working in Chicago. We believe that no experiments have been tried with masses as large as a rail, or in fact with anything thicker than a thin sheet of solder.

An English High-Speed Engine.

Messrs. Willians & Robinson, Engineers, at Surrey, England, are building an interesting high-speed engine. This engine runs satisfactorily at 700 revolutions per minute as a maximum speed, and develops a little over 200 H. P. It is what is known as a "self-contained" engine, and is very compact and therefore suitable for driving all manner of dynamos and high-speed machinery directly without the use of belting or gearing of any sort. Recent tests made by Prof. Alex. B. W. Kennedy, of Kings College, show that these engines are very economical and give promise of commercial success. The designs are such as to lead one to believe that the claims of only 18 and 20 lbs. of water per horse power per hour are probably justifiable. The following extracts from a circular issued by the makers are instructive and confine the use of double and triple expansion to definite limits:

"If the boiler pressure always exceeds 70 lbs., it is worth while to use a compound engine; if as high as 150 lbs., a triple-expansion engine. If the engine exhausts into a vacuum, the corresponding pressures will be about one-fourth lower. The extent to which the steam may be expanded with advantage depends upon the boiler pressure. If the expansion is carried to more than a certain number of volumes, it is advantageous to divide it into two stages, *i. e.*, to expand partly in a high-pressure or small cylinder or cylinders, and partly in a low pressure or large cylinder or cylinders. With still greater expansion it is worth while to expand in three stages, *i. e.*, in three successive cylinders of increasing diameter, and so on. But although there are great practical and economic advantages in the system of expansion in successive stages, there is no essential difference *in principle* between expanding, say, eight times in a series of three cylinders, with a comparatively late cut-off in the first or smallest one, and expanding eight times in the largest of the three only, with the steam admitted to it direct, and cut off at one-eighth stroke."

The Hudson River Tunnel.

Work on this enterprise is steadily progressing. It is said to be the present intention to push the north tunnel to completion first, and it is expected that trains may be run through for the accommodation of those attending the World's Fair of 1892.

The Simplon Tunnel.

A London dispatch of the 21st states that an influential German company has been formed, with a capital of 30,000,000 francs, to complete the Simplon tunnel. The company has acquired two Swiss railroads from Lucerne. Italy will provide 15,000,000 francs.

The Harris Sleeping Car.

The Harris Palatial Car Co. has been organized in Portland, Me., with a capital of $1,000,000, to build cars under a patent granted to Louie J. Harris and Arthur W. Crossley, of Boston, the first named being the inventor. The invention consists of a combination of sleeping car and parlor car, the berths being in the daytime located in pockets under the floor, while at night they are quickly raised into position, the chairs taking their place in the pockets under the berths. The following officers have been elected: President, Edward F. Perkins, of Boston; Vice-President and General Manager, Louie J. Harris, of Boston; Treasurer, Albert C. Burrage, of Boston; Secretary, Luther L. Harris, of Boston; Clerk, Edward M. Rand, of Portland. It is stated that negotiations are nearly completed for the construction of a car under the patents controlled by the company, which, it is expected, will be ready for service in a few months.

Hydraulic Canal Lift at Mons, Belgium.

During the visit of the American engineers at this lift, which is at La Louvre on the Canal du Centre, near Mons, Belgium, a description of the same was given by Mr. Gruson, Engineer of Roads and Bridges, and by an engineer of the "Anciens Etablissements Cail," builders of elevators, of which the following is an extract; This canal lift was quite fully described in the *Engineer* (London), Dec. 21, 1888, and Jan 11 and 25, 1889. The structure consists of a vertically moving trough or tank which carries the canal boats; the trough is raised and lowered by means of a hydraulic ram 6 ft. $6\frac{3}{4}$ in. in diameter.

The canal system is chiefly due to the first Napoleon, who planned and in part executed a complete network of canals, joining all the important inland towns with the seaports. Among those designed was a cross canal to connect Charleroi and the centre coal basins and the north of France, and also open a more direct route to Brussels and the sea, for the large exports from the industrial district around Mons.

The two canals that it was proposed to join were in the centre basin, the Mons and Condé Canal, and a short branch—embranchment d'Houdeng—of the Charleroi and Brussels Canal. The distance between the two was only 15 kilos—$9\frac{1}{3}$ miles—but the difference in level between them was 89.45 metres—293 ft. 6 in.—and owing to the abrupt geological formation this difference lay almost entirely within a space of a couple of miles or so. When we add that there is no water available, even the existing canal from Charleroi to Brussels being artificially supplied, and that the barges navigating these canals were 39 metres—128 ft.—long, and demand 8 ft. depth of water, it is clear that the use of ordinary locks, with their tremendous waste of water, would be highly impracticable.

The size of the barges navigating the Belgian broad gauge canals is fixed at a maximum length of 39 metres, without rudder, of a maximum breath of 5 metres, and a draught of 2 metres, so that the sizes fixed for the locks on these canals are: Length between gates, 43 metres—141 ft.; breadth, 5.80 metres—19 ft.; and the depth of water over the sill, 2.40 metres—7 ft. $10\frac{1}{2}$ in. The trough or piatoon which forms the receptacle for the boats in the hydraulic lift was therefore made of the same dimensions, with a mean depth of water in the 2.40 metres—7 ft. $10\frac{1}{2}$ in. This trough is constructed exactly like a swing bridge. There are two main horizontal lattice girders, each 43.0 metres—141 ft.—long, with a depth of 6.00 metres—19 ft. 8 in.—in the centre, falling to 4.00 metres—13 ft. $1\frac{1}{2}$ in.—at each end. On a set of transverse girders is a set of lighter longitudinal beams to which the bottom plating is riveted; and the side plating being riveted to the main girders, it forms a long watertight trough open at each end, but provided with doors which can be raised or lowered at will.

The end of the upper canal is carried out by an embankment and retaining wall to a certain distance, and then, by means of an aqueduct of 17.80 metres—58 ft. 5 in. long—of a similar construction to the troughs, and like them terminated with a movable gate. The lower canal is also terminated with a short metallic lining, also furnished with a movable gate; so that we now have, so to speak, three separate constructions: (1) an upper canal projecting out into the air, closed with a movable gate; (2) a piece of canal large enough to contain the biggest barges afloat, and closed at each end with movable gates; and (3) a canal at the lower level, also terminated with a movable gate.

The ram is placed centrally under the middle of the trough, so that everything is poised and in perfect equilibrium. The upper and lower canals are so located that the trough just fills up the space between their terminations; that is to say, that when the trough is down its lower end just comes opposite to the termination of the lower canal; and when the trough is up, its upper end just meets the terminating face of the upper canal. The ends of the troughs and canals are not made quite vertical, but slightly beveled, so as to form a wedge. It is by pressure against this wedge that a watertight joint is made between the movable and fixed parts.

The main guiding of the movable trough is effected by means of the large pyramidal central guides; the sides of the trough are furnished, so to speak, with a large cross-head, 25 ft. 7 in. long, which slides up and down in the slot in the guides. Further guides are provided at each end, but these are only to prevent any rotary horizontal movement that might be set up by the action of the wind. In fact, the guides at the lower end might be entirely dispensed with, as being quite unnecessary. The whole of the guides are well tied together in all senses, and form, therefore, a very powerful framework all round the lift. Now, it would have been a tedious and wasteful job to have had to pump up the lift every time it was required, and, therefore, one lift has been exactly balanced by a second similar one parallel to and alongside it. The upper and lower canals are, therefore, each divided into branches corresponding to the two troughs. The advantages of this system are at once apparent. There is, so to speak, a double line of rails; boats can go up at the same time as others can come down, and therefore double the traffic can pass; and, mechanically speaking, since the two troughs are of equal weight, they will be in equilibrium on their rams, and the only force required will be the small amount necessary to overcome friction and compensate for the displacement of the emerging ram. Now this force can be easily obtained from the upper canal without the intervention of any machinery, simply by letting a little more water into the upper trough. This is practically done by not allowing it to go to its full height, but stopping it about 8 in. short. It therefore receives a layer of just 8 in. more water, and is proportionally heavier than the lower trough. Therefore, when the communication valve is opened, this heavier trough decends, forcing up the other one. The descending one is stopped 8 in. too high, and the surplus water run off; it then becomes of normal weight again, and is ready to be forced up in its turn.

After numerous trials and experiments it was definitely determined to make the presses of cast-iron, turned 4 in. thick, round which weldless steel tires are shrunk, like coils on a gun. The thickness of these steel coils is 2 in. The ordinary working pressure on the press is 470 lbs. per square inch; and the coils are so shrunk on that they set up a compression on the cast-iron of nearly the same amount, so that practically there is no strain on the cast-iron portion of the

press at all, which simply acts as a sort of water-tight lining, and the mild steel hoops do all the work.

Goodwin's Improved Dump Car.

Mr. John M. Goodwin, Mem. Am. Soc. C. E., for many years an assiduous and able worker for the advancement of standards in railroad practice, as witness his many, and always timely, contributions to the columns of the *Railroad Gazette*, noticeably those relating to signals, "coupler reform," and the propriety of providing for any line of freight-service cars specially adapted to such service, has recently taken out several patents for improvements of the non-careening dump car originated by him, and known as the "Goodwin Dump." The car, as improved, not only dumps its whole load from either side or half the load from each side, as does the original car, but furthermore discharges the whole, or any desired portion of the load, between rails.

A sensible diminution of the cost of handling dumpable freights, particularly those received as "stock" at blast furnaces, is a growing necessity. Any betterment of the conditions affecting the blast furnaces is a betterment of the business status of the railroads serving those furnaces. Hence if a dump car will lessen expenditure on the part of consignees of coal, ores, coke and limestone, the railroads will do well to provide the car. Moreover, as reason suggests, and as experience in actual practice demonstrates, with a proper dump-car equipment, the service of a furnace may be performed with an amount of rolling stock anywhere from one-fourth to one-half less than that necessary in case of use of gondolas for ore and limestone, and of crates, stock cars and box cars for coke handling.

With these facts in view we commend to those of our readers who have to do with the matters in question a timely inquiry as to the particular merits of the cars above mentioned, concerning which we have authenticated reports showing them as possessing a remarkable capacity for usefulness.

Mr. Goodwin's adddress is Sharpsville, Mercer Co., Pa.

Notes at the Paris Exhibition.

The largest piece of machinery exhibited at Paris is a large English lathe, weighing 300 tons, and long enough to swing a piece 79 ft. long between centres and 10 ft. in diameter. The heads are double—that is, both head and tail stock are alike. It is supplied with four slide rests, two upon each side; therefore, upon cannons and like pieces, four sets of tools can be cutting at the same time in different parts. This lathe has just been put into position and forms an object of great interest to visitors.

J. A. Fay & Co., of Cincinnati, have the best wood-working tool exhibit at the Exposition. It is running on actual work, and the rapid processes elicit much admiration from the European, who still uses the mallet and chisel to prepare lumber for joinery work. Probably no other tool in the Exhibition attracts the curious so much as the augur which bores a square hole. Many of the European railroad men had not seen or heard of this tool, and when it was mentioned to them they were anxious to try one. Its use, however, is limited for continental car work, because almost invariably the sills of cars and tenders are made of iron or steel. The exhibit of J. A. Fay & Co. is the headquarters of the United States exhibitors.

Sand Pumping on Lake Erie.

Capt. F. A. Mahan, United States Engineers, has chartered a steamer and rigged a sand pump on it, thinking that he could dredge sand more cheaply than by the ordinary method. With a complete apparatus he has succeeded in dredging seven cubic yards per hour, and has now ordered a Worthington pump, which is expected to increase the capacity to 100 yards per hour. It is found that Gen. Roy Stone's plan of projecting a stream of water into the sand directly in front of the suction greatly increases the amount dredged.

The Cambria Iron Works and New Johnstown.

A very creditable and enterprising plan to assist in the rebuilding of Johnstown will be entered into by the Cambria Iron Works. The company has 150 acres, which, with property it already owns, gives it entire possession of all the territory now lying between the stone viaduct of the Pennsylvania Railroad and Morrellville and back beyond the southwestern limits of Kernville. The tract is quite hilly, but on the top there is a magnificent plateau, several hundred acres in extent. The company proposes to lay the territory out in lots of convenient size, to grade streets through it, and sell them to the residents of the town on liberal terms. It will erect two inclined planes, one for passengers and one for freight traffic. The company will also furnish lumber and other material for building, and allow the utmost latitude for purchasers to go ahead and build at the earliest possible time.—*Pittsburgh Commercial Gazette.*

How to Fire a Locomotive.

Not the least of the merits of Baker's Manual of Instruction for Engineers and Firemen, noticed in the *Railroad Gazette* of Aug. 9, is its clear and simple language. Insufficient care in the preparation of instructions is a common defect on railroads, and is, perhaps, as noticeable in the locomotive department as elsewhere. We therefore give as a sample and as an instructive contrast to the meagre or hasty paragraphs prepared for firemen on many roads, the following extract.

INSTRUCTIONS FOR FIREMEN.

1. Upon arriving at their engines firemen must assure themselves of the condition of the fire, the ash pan, and see that the grates are all connected and in order, and that there are upon the tender the necessary tools for handling the fuel and attending to the fire. Anything in bad order must be reported to the engineer.

2. Firemen must have their fire in readiness before the engine starts the train, and have sufficient fuel on the fire to hold it and keep up steam while engine is starting train, avoiding, as much as possible, opening fire door while exhaust is strong.

3. Coal must be broken into pieces as near egg size as possible, and when put upon the fire must be scattered over the fire's surface as evenly as possible, giving the sides and corners the preference, but must never be thrown in heaps on any part of the fire.

4. Firemen must fire lightly and frequently, and avoid heavy firing. They must use upon engines with 15-in. cylinders and less, but two shovelfuls to each fire; with 16-in. cylinders, but three shovelfuls to each fire; with 17 and 18-in. cylinders, but four shovelfuls to each fire; with 19 and 20-in. cylinders, but five shovelfuls to each fire. The fire-door must be closed between each shovelful when engine is working.

5. Firemen on passenger engines, after the first 30 miles have been run, must shake their grates lightly every 30 miles. Firemen on freight engines, after the first 20 miles have been run, must shake their grates lightly every 20 miles.

6. When clinkers become formed in the fire-box firemen must improve the first opportunity to clean them out, and must not try to run the last part of a trip with a clinkered fire, if there is a chance to clean it.

7. Firemen must keep steam pressure within the limits of ten pounds, and must not permit it to change rapidly either way. While injector is working after steam is shut off from cylinders, the blower must be used when necessary to prevent change of temperature of boiler.

8. To prevent or stop blowing off, increase boiler feed, or, if necessary, drop dampers.

If necessary to open fire door for this purpose while engine is working, open but slightly, or swing open and shut.

9. Smoking and drumming of engine must be prevented at stations, or while near or attached to passenger trains.

10. Ash pans and fires must not be cleaned near any bridge or culvert, depot or building, or on any frog or switch; and in all cases fire must be thoroughly drowned with water before being left.

INSTRUCTIONS FOR FIREMEN AND HOSTLERS.

11. Hostlers must be sure that the flue sheets are cleaned of adhering clinkers before engines are fired up, and that the fire is evenly placed over the entire grate surface.

Hostlers and firemen must be particularly careful that a bed of fire is over the forward portion of the grates and next the flue sheet before the blower is used.

12 At all times blower must be used as lightly as possible to effect the desired purpose.

13. After fire has been removed from the fire-box the dampers and fire doors must be kept closed while engine is being handled.

THE SCRAP HEAP.

Notes.

Train No. 2 of the Wabash, on Aug. 13, ran from Kansas City to St. Louis, 277 miles, in 7 hours and 10 minutes, making 22 stops, of which one was for dinner.

Dispatches from Erie, Pa., state that the trainmen running local freight trains on the Philadelphia & Erie have been discharged for refusing to work on "double" trains.

The monster dry dock at Halifax, Nova Scotia, has been completed and will be formally opened next month. This is one of the largest dry docks in the world, 620 ft. in length and 102 ft. wide.

The Louisville & Nashville will raise the wages of passenger conductors on Sept. 1 from $100 a month to $110. It will be remembered that a considerable number of the old conductors were discharged a few weeks ago.

The Railroad Commissioners of Maine will give a hearing at Augusta on Aug. 28 and 29, on the question of heating cars by steam, concerning which a law was passed by the Legislature of that state at its last session.

The Union Pacific now has a daily dining car service on the Overland Flyer. This service has been transferred to the control of the Pullman Palace Car Co. A dining car service is to be added to the Oregon Short Line.

The Omaha Union Depot Co. has been incorporated at Omaha, Neb., by W. H. Holcomb, Thomas L. Kimball, E. Dickenson, G. W. Holdredge and J. G. Taylor. The capital stock is placed at $1,500,000.

The Inter-state Commerce Commission has issued to each of the land grant railroads, a circular of inquiry concerning the operation of telegraph lines, in pursuance of the investigation upon the complaint made by the Postal Telegraph Co. some time ago, that certain roads did not comply with the law requiring them to prorate with any telegraph company tendering business to them.

Building New Railroads in Jamaica.

Articles of association were filed by the West India Improvement Company at Albany, N. Y., Aug. 14, a corporation organized to construct and operate a railroad to run from Kingston to Spanishtown and Porus, and from Porus to Montego Bay, and from Spanishtown via Bog Walk to Port Antonio, in the Island of Jamaica, in the West Indies. The capital stock is $500,000. Ansley S. Davis, Massapequa, L. I.; David Colman, Wm. V. Burrill, Elias L. Frank, Charles L. Davis, New York City; George Russell, William C. Stuart, Joseph C. Van Doren, Aaron Da Costa Gomez, Brooklyn, N. Y.; and Colles T. Pond, Plainfield, N. J., are the incorporators. Elias L. Frank subscribes for 4,910 of the 5,000 shares of the capital stock.

Through Time from St. Petersburg to Samarcand.

Mr. Charles Marvin, in the Allahabad *Morning Post*, after calling attention to the fact that ten years ago the Caspian was for all trade purposes a sort of dead sea, and that now 200 steamers could be assembled at Baku in less than a week, mentions that the Caucasus and Mercury Co., which owns many fine steamers on the Volga and Caspian, publishes the following through time table from St. Petersburg to Samarcand: Leaving the Russian capital on Monday at 8 a. m., the passenger reaches Tsaritzin, on the Volga, on Friday at 8 a. m., having passed through Moscow and Griazi. The steamer leaves Tsaritzin at 10 a. m., and reaches Azoun Ada at 8 a. m. Monday, and, leaving that place at 3:45 p. m., reaches Samarcand on Thursday morning at 7 o'clock.

This is not, as Mr. Marvin points out, an express service, but is an improvement on the old arrangement when the boats ran without reference to the Trans-Caspian railroad, and as only two trains a week are despatched over that road to Samarcand, the seven or eight hours' wait at Azoun Ada was liable to be increased to one or two days, unless one preferred to wait in Merv, to which point trains run daily.

The fare from Azoun Ada to Samarcand, 900 miles, is $18. It is said, however, that one has to travel in second-class cars.

Passengers Must be Made Comfortable.

An exchange says that the Old Colony Railroad is credited with a new idea "original in its inception and humane in its object." The conductors are to be given lessons in removing cinders from the eyes of passengers. As the time consumed in giving these lessons must be enormous, we surmise that this is merely an underhanded scheme by which the superintendent is trying to give his conductors a week's vacation while allowing the directors to think that the men are still on duty. Or, possibly the whole thing was started by those conductors whose trains are patronized by large numbers of young lady passengers. A recent picture in an illustrated paper suggests that the removal of cinders is a task which is attended by pleasanter surroundings at some times than it is at others.

Certified Railroad Lands.

The annual report of Acting Commissioner Stone, of the General Land Office, now in press, will show that during the fiscal year ended June 30, 1889, there were certified to railroad companies, under various grants, a total of 425 046 acres of land, or 404,116 less than the total certifications of the previous fiscal year. There were pending in the General Land Office on June 30, 1889, railroad selections under former grants amounting to 29 444,251 acres, which is an increase for the year of 4,014,385 acres.

The President of the N. Y. C.

A countryman in New York, who noticed the iron plates that cover the water connection beneath the pavements that bear the letters D. P. W. (Department of Public Works), cast in iron, is said to have remarked that he "always knew Depew was one o' your big bugs, but I'll be eternally consarned if I thought he owned all the roads in town!"

Splendors Inconceivable.

That overbuilding of railroads is one of the great evils this country is now suffering from is patent to every observer, and the different kinds of woe resulting, together with the most hopeful remedies, are made the subject of editorials in country newspapers that never before rose to the dignity of having a real editorial. It has been quite generally supposed that the people who projected these roads and those who encouraged the projectors were, as a general thing, doing the best they knew how; that there seemed, to them, to be a real need of more railroads on the barren plains of Kansas and in the desolate wilds of the Northwest. After such honorable and innocent failure to rightly prognosticate the tendencies of the times, how doubly poignant must be the remorse of the men who have built hundreds of miles of useless railroads and sunk millions of dollars of other people's money in doing it, to find that they might just as well have built roads where they would amount to suthin'. Let the eloquence of a Southern exchange tell the rest.

"ADAIRSVILLE, Ga., July 23.—[Special.]—The people are again stirred up over the prospect of a new railroad running from Rome by Adairsville, connecting with the Richmond & Danville at some point near Gainesville. It is said that this is almost certain. What this road will do cannot be imagined. It is impossible, for never has a road been projected through as fine mineral and agricultural district as this will be. Think of iron ore for ballast. It will be used if this road goes near the route now spoke of; gold, lead and coal is to be found in the right of way. It will be surrounded by fields that this year made thirty to thirty-five bushels of wheat to the acre, with clover six feet high, while corn is so plentiful it has no value scarcely, hard woods of every kind can be easily obtained where the temperature is never too low nor too high; where fine stock is raised, that a pair of pigs just from their mother bring $18, and the mild-eyed Jersey gives her bountiful supply of milk; where money and its influence has its home, and every man's credit is good; where no mortgage is asked and no notes taken; where every man is your neighbor, and every woman is the fairest and truest that God ever blest a country with. Such is the district that this road is to open. Come and see if it is not so."

The strifes between the Chicago and Missouri river packers must seem to the participators like petty trifling when they read of this El Dorado of "hog products."

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

The Supreme Court of Colorado decides that the state statute which provides that "every railroad corporation operating its line of road, or any part thereof, in this state, shall be liable for all damages by fire that is set or caused by operating any such line of road, or any part thereof," is constitutional.[1]

In Indiana a railroad wrote to its attorneys inclosing passes, to be full compensation for legal services for one year, except for assisting in the trials of cases other than stock cases; for such services reasonable attorneys' fees were to be paid. The Supreme Court holds that the company is liable, where the evidence showed that the attorneys appeared in 28 actions, 5 of which went to trial, and in the others demurrers were argued, and answers afterwards filed, but which were never tried.[2]

In Kentucky the plaintiff contracted with a railroad to construct a bridge, it being stipulated that for any reason deemed sufficient to the company it was to have the privilege, by giving the plaintiff one month's notice, to annul the contract, to discontinue the work, or continue it in such manner as it might choose, the contractor to be entitled to payment in full for all material delivered and work done, the company to take the working plant at a fair valuation, to be determined by an arbitrator. "In case the contractor shall not well and truly * * * comply with and perform all the terms herein stipulated, or in case it should appear to the engineer of the (defendant) company that the work does not progress with sufficient speed or in a proper manner," the railroad may annul the contract, if it sees fit, and the unpaid part of the value of the work done shall be forfeited. The Court of Appeals holds that the right of the company to annul the contract whenever it appeared to its engineer that the work was not progressing with sufficient speed or in a proper manner might be exercised without question by or notice to the contractor.[3]

In Kansas bonds were voted by a county to a railroad in payment of its subscription to its capital stock, on the condition, among others, that the company should receive the bonds when its road was "built of standard gauge, and completed as first class, and in operation by lease or otherwise." The Supreme Court holds that, to entitle the railroad to receive the bonds of the county, its road, if constructed according to the terms of the contract, need not have been perfect in every respect at the prescribed date for its completion, but it should have been completed and in operation at that date in such a manner that it might be properly and regularly used for the purpose of transporting freight and passengers.[4]

In a case in the Supreme Court of the United States an extension company which had a contract with a railroad to locate and construct the road "by the nearest, cheapest and most suitable route," between two points, for $20,000 per mile, agreed to locate the road through the town of A. in consideration of being paid a bonus by the defendant corporation. In locating the road through A. it was necessary to deflect from the nearest, cheapest and most natural route a distance of five miles, at an additional cost of $100,000. The court rules that the contract between the extension company and the defendant corporation being an agreement by an employé to violate his obligation to his employer, was against public policy and void, and likewise the contract of the company to disregard its duty, and locate and construct the road by a longer road than was required, was also a wrong upon the public.[5]

The Supreme Court of Pennsylvania holds that the gross receipts of a railroad from transportation between terminal points, one or both of which are without the state, by route lying partly within or wholly without the state, are not subject to taxation by such state, though the company's franchises were derived from it.[6]

Carriage of Goods and Injuries to Property.

In Colorado the Supreme Court rules that a railroad receiving goods from a connecting carrier consigned to a point on its line is entitled to its freight charges, although the consigner had directed (unknown to the railroad) that the transportation should be completed by another road.[7]

The Supreme Court of the United States decides that where a station agent having authority to sign bills of lading, by collusion with a pretended shipper, issues a bill of lading of goods which are not delivered for transportation, and which have no existence, and the shipper negotiates it for value to a third person, who is ignorant of the facts, the railroad company is not liable on the bill to the purchaser, the fraud of the agent being outside the scope of his employment, as he could only issue bills for property delivered. The Texas statutes which provide that the trip or voyage commences from the time of the signing of the bill of lading issued on the delivery of the goods, and under which the carrier cannot avoid his liability, even though the goods are not actually on their passage at the time of loss, have no application to such a case.[8]

In Vermont, while the mortgagor of land was in possession, petitioner, with his consent, but without paying any damages, entered on and constructed its railroad across the premises. Subsequently, defendant, the mortgagee, brought suit to foreclose, making petitioner a party defendant, and obtained a decree of foreclosure, whereupon petitioner instituted proceedings to condemn the land. Defendant claimed that the *corpus* of the railroad and improvements belonged to him, under the maxim, *quicquid plantatur solo, solo cedit*, and that he was entitled to compensation therefor. The Supreme Court holds that the maxim does not apply. The mortgagor's consent, given at the time when defendant had merely a lien on the land, was effective to shield petitioner from being a trespasser as to any one.[9]

In Virginia the plaintiff, after unloading a drove of mules from defendant's cars, attempted in the night-time to drive them through the streets of a city to a stable. A part of the drove started in the wrong direction down a street, across which an engine belonging to defendant was standing, partly obstructing the street. In the attempts by plaintiff's driver to get ahead of the mules, some of them passed in front of the engine and dashed off up the railroad track and were struck by a passenger train, which came along shortly, running at a high rate of speed. In an action for their loss, the Supreme Court holds that if defendant unlawfully obstructed the street, and such obstruction was the cause of the animals being turned onto the track, whereby the injuries were sustained, the defendant railroad is liable, unless plaintiffs could have prevented them from reaching the point of crossing by reasonable diligence, or could have secured them after they got on the track.[10]

The Supreme Court of Pennsylvania rules that the duty of the jury in the ascertainment of damages to land on which a quarry of stone is situated, is properly stated in a charge that "all the testimony from any part of plaintiffs' witnesses who spoke of valuing the stone underlying the railroad must be disregarded by the jury, and the testimony of these witnesses must be taken, not to the stone, * * * but what was the true market value; and if the market value that they testify to has reference to the stone which underlies the railroad, and making that a special part of the difference in the market value, that must be disregarded."[11]

Injuries to Passengers, Employees and Strangers.

In Pennsylvania the plaintiff, while a passenger on a train in rapid motion was struck over the eye by a hard substance, thought by surgeons to be coal, and was severely injured. Another train was at the time passing, and the engine was opposite plaintiff. There was no evidence to show where the missile came from. The operators of plaintiff's train testified that they knew nothing of it and did nothing to cause it, and those of passing trains testified that nothing was thrown or escaped from their trains. There was evidence that the appliances and machinery of the trains were in good order. The Supreme Court rules that no presumption of negligence arose from the mere fact of injury to plaintiff, but would arise only from the fact that the injury resulted from something connected with the operation of the railroad.[12]

In Washington a workman on the railroad track was injured by a collision of the gravel train which was carrying him to his work, with a "wild train," which had orders to flag the gravel train. The rules required flagging to be three-fourths of a mile ahead of the flagging train, but the wild train followed within 400 feet of its flagman, whose signal, by reason of a curve, could not be seen by the gravel train until meeting it. The engine of the wild train was disabled so that it could not start or stop promptly. The Supreme Court holds that a charge that the wild train had no business to be where it was when the collision occurred, but should have remained where it was when the flagman alighted until he had proceeded a sufficient distance forward, and that this was gross negligence on the part of those in charge, was correct.[13]

In New York a servant of a railroad company, while at work in its pit as an ashman, was run over by an engine of defendant, another company, which had permission from the owner of the premises to use the track. The Court of Appeals decides that deceased and defendant's engineer and fireman were not fellow-servants.[14]

In California, in an action by a brakeman against a railroad company for injuries received in a collision with an ox which was on the track through defendant's negligence in not keeping up proper fences, it appeared that it was apparent to any one who looked at them that the fences were insufficient to turn stock; and it was known that cattle had frequently broken through them while plaintiff was in defendant's employment, when the train would be stopped and the cattle driven off the track, and at least once plaintiff had assisted in driving them off. But there was evidence to show that he did not know of the particular defect causing the injury, or that means had not been taken to remedy the defects. The Court charged that if plaintiff knew the condition of the fences, or, as a reasonably prudent man, should have known it, the verdict must be for defendant. The Supreme Court affirms a verdict against the company.[15]

In New York a boy of eleven was stealing a ride on a freight car, it being the habit of the boys of the neighborhood to jump on the cars and ride for several blocks to the station. In answer to the brakeman's order to get off, the boy asked him to wait until he got to the station. The brakeman began throwing pieces of coal at him, and pursuing him from car to car. Just as he was getting ready to jump the brakeman rolled a large lump of coal, which struck him on the head, knocking him from the car and under the train, which was going about 10 miles and hour. The Supreme Court holds the company liable.[16]

In Maine the deceased and others were driving slowly toward a railroad crossing at night. They heard a whistle, but were uncertain whether it came from the road ahead or from one near by. The gate at the crossing, though usually attended when trains were passing, was open, and no flagman was near. The view of the approaching train was obstructed, and deceased drove on and was struck by it. The train was moving at about 25 miles an hour. The statute forbade greater speed than six miles an hour in such place, unless gates or flagmen were maintained. The Supreme Court rules that judgment against the railroad company for the death of deceased would not be reversed for contributory negligence.[17]

In New York the Supreme Court holds that where a railroad company has treated a private road crossing as a public highway by putting up the usual signal-posts, and by adopting the custom of giving the statutory signals required for public highways, its failure to give such signals thereat is negligence *per se*, if an accident is caused thereby.[18]

In Massachusetts the plaintiff attempted to drive across a track, when he was struck and injured by a passenger train. There were two main and two side tracks, separated by a distance of 6 or 7 ft. Plaintiff knew the crossing well, and knew that the train in question was about due, and that no flagman or gates were kept there. He approached from the south, and, when opposite a barn which obstructed his view, was compelled to stop by a freight train on the south side track. As soon as the freight train passed, he drove on, though, if he had waited a moment, he could easily have seen the approaching passenger train. The Supreme Court holds that he was guilty of negligence, and could not recover.[19]

1 Union Pac. R. Co. v. De Bush, 20 Pac. Rep., 752.
2 Louisville, etc., R. Co. v. Reynolds, 20 N. E. Rep., 711.
3 Henderson Bridge Co. vs. O'Connor, 11 S. W., Rep. 18.
4 South Kan. & P. R. Co. v. Toner, 21 Pac. Rep., 221.
5 Woodstock Trust Co. v. R. & D. Ex. Co. 9 Sup. Ct. Rep. 402.
6 Com. v. L. V. R. Co., 17 Atl. Rep. 179.
7 Price v. Denver & R. Co., 21 Pac. Rep., 188.
8 Friedlander v. T. & P. R. Co., 9 S. C. Rep., 570.
9 St. Johnsbury v. L. C. R. Co. Willard, 17 Atl. Rep., 38.
10 Richmond & D. R. Co. v. Noell, 9 S. E. Rep., 473.
11 Reading & P. R. Co. v. Balthasar, 17 Atl. Rep. 518.
12 Penn. R. Co. v. Mackenney, 17 Atl. Rep. 14.
13 North Pac. R. Co., v. O'Brien, 21 Pac. Rep., 32.
14 Sullivan v. Tioga R. Co., 27 N. E. Rep., 569.
15 Magee v. North. Pac. R. Co., 21 Pac. Rep. 114.
16 Lang v. N. Y., L. E. & W. R. Co., 4 N. Y. Supp., 565.
17 Hooper v. B. & M. R. Co., 17 Atl. Rep., 64.
18 Nash v. N. Y. Cent., etc., R. Co., 4 N. Y., Supp., 525.
19 Fletcher v. Fitchburg R. Co., 21 N. E. Rep., 312.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atlanta & West Point, semi-annual, six per cent.

Cincinnati, Sandusky & Cleveland, semi-annual, 1½ per cent.

Marquette, Houghton & Ontonagon, semi-annual three per cent upon preferred stock, payable Aug. 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Central Countries, special meeting, Ottawa, Can., Sept. 10.

Central New England & Western, special meeting, 115 Broadway, New York City, Aug. 30.

Chatham, special meeting, Chatham, N. B., Sept. 2, to organize the company and elect officers.

Hereford, annual meeting, Cookshire, Que., Sept. 2.

Minneapolis, St. Paul & Sault Ste. Marie, annual meeting, Minneapolis, Minn., Sept. 17.

Nashville, Chattanooga & St. Louis, annual meeting, Nashville, Tenn., Sept. 11.

Nashville & West Nashville, special meeting, Nashville, Tenn., Oct. 9

Ohio, Indiana & Western, annual meeting, Indianapolis, Ind., Sept. 11.

Ohio Southern, special meeting, Springfield, Ohio, Aug. 30.

Terminal Railroad Association of St. Louis, special meeting, St. Louis, Mo., Oct. 1.

Toledo & Ohio Central, annual meeting, Toledo, O., Sept. 2.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its seventh annual convention at Denver, Colo., Sept. 10.

The *Master Car and Locomotive Painters' Association* will hold its twentieth annual convention in Chicago Sept. 11. The headquarters are at the Tremont Hotel.

The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The *New England Railroad Club* meets at its rooms in the United States Botel, Beach street, Boston, on the second Wednesday of each month, except June, July and August. The next meeting will be held Sept. 11.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month

The *Engineers' Club of St. Louis* holds regular meetings St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p.m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Society of Civil Engineers.

The nominating committee, Messrs. Stevenson Towle, O. E. Michaelis, Fred H. Smith, Arthur Macy, John F. Wallace, issue the following circular:

The work of the nominating committees in past years has sometimes been criticised as not reflecting the wishes of the society membership as to candidates for the various offices.

Will you kindly send to the committee the names of members whom you may consider desirable nominees for some or all of the various offices?

The officers to be nominated are, the president, two vice-presidents, a secretary, a treasurer and five directors.

Of these, at least one vice-president, three directors, the secretary and the treasurer must be resident within fifty miles of New York, as provided by the society law.

Replies to be sent to Nominating Committee, Am. Soc. C. E., 127 East 23d street, New York, N. Y.

PERSONAL.

—Mr. Louis C. Gable, Master Mechanic of the Chesapeake, Ohio & Southwestern at Paducah, Ky., died in that place this week of heart failure.

— Mr. William C. Morris, Jr., for many years Auditor of Coal Freights for the Lehigh Valley, died suddenly this week at his home in Mauch Chunk, Pa.

—Mr. John Chisholm, formerly Roadmaster of the northern division of the Grand Rapids & Indiana road, died at his home in Kent City, Mich., Aug. 16.

—Judge Frederic Watts, formerly President of the Cumberland Valley Road and a distinguished lawyer, died in Carlisle, Pa., Aug. 17, aged 88 years.

—Mr. J. McQuiston, who was for many years a Roadmaster on the Cincinnati, Indianapolis & Chicago, has entered the service of the Weir Frog & Switch Co., of Cincinnati.

—Mr. A. D. Dwelle, for some time past Assistant General Passenger Agent of the Wabash, has been appointed Assistant General Passenger and Ticket Agent of the Iowa Central.

—The Iowa Republican Convention has nominated for Governor Mr. J. G. Hutchinson. Governor Larrabee, who was a candidate for the nomination for another term, was defeated.

—Mr. E. J. Remillion, Superintendent of the Kansas City Switch and Frog Works, died Aug. 10 in that city. He was well known among railroad men as the inventor of a patent three-throw switch.

—Mr. George Laidlaw, who built the Toronto, Grey & Bruce road and the Credit Valley road, died suddenly at his country residence on Balsam Lake, Ont., recently. Mr. Laidlaw was also the projector of the Toronto & Nipissing road.

—Mr. Edward Van Etten, late Superintendent of the Buffalo Division of the New York, Lake Erie & Western last week received a solid silver service of eight pieces, as well as a case of solid spoons, the gift of the employés of the division.

—After a service of more than 30 years, Mr. J. Bradt, the Master Mechanic of the New York, Lake Erie & Western, at Rochester, N. Y., has resigned his position. He will be succeeded by J. E. Sague, from the Jersey City shops. Mr. Bradt will engage in other business after a short rest.

—Mr. William Hassman has been appointed Master Mechanic of the Huntington & Cincinnati division of the Chesapeake & Ohio, vice Mr. F. A. Givin, appointed Master Mechanic of the Richmond & James River division, vice Mr. William Hassman, transferred. The main shops are to be located on the Huntington & Cincinnati division.

—A cablegram was received in Pittsburgh, Aug. 17, announcing the death, in Paris, of Mr. William Thaw, Second Vice-President of the Pennsylvania Company and Vice-President of the Pittsburgh, Cincinnati & St. Louis. He was a man of great wealth, and he gave liberally to various educational and benevolent objects, his gifts to the Western University alone being between $300,000 and $400,000.

—Col. J. B. Browning, who for several years has been General Baggage Agent of the Louisville, New Albany & Chicago, has resigned that office. Col. Browning has for some time filled the joint position of General Baggage Agent of both the Louisville, New Albany & Chicago and the Louisville & Nashville. His duties with the Louisville & Nashville have so increased that it became impossible for him to attend to the two offices.

—Ex-Governor John C. Brown, late President and Receiver of the Texas & Pacific, and since last April President of the Tennessee Coal, Iron & Railroad Co., died at Red Boiling Spring, Tenn., Aug. 17, of hemorrhage of the stomach. He was 63 years old. Gov. Brown's first railroad service was in Tennessee. In 1875 he became Vice-President of the Texas & Pacific. He was General Solicitor of the Missouri Pacific from 1875 to 1881, when he was appointed Receiver of the Texas & Pacific.

—Mr. George B. Gatchell, General Superintendent of the Western New York & Pennsylvania, has resigned. Mr. Gatchell's first service on this road was in 1866, when it was the Buffalo, New York & Philadelphia. He entered its employ as a rod man, and in 1867 became Assistant Engineer. He later held the same position on the Rochester & State Line and the Chicago & West Michigan roads. He returned to the Buffalo, New York & Philadelphia in 1870 as Assistant Engineer. He has since been Chief Engineer for five years, and General Superintendent since 1879.

—Mr. Isaac P. Chambers, Comptroller of the New York Central & Hudson River road, died in Saratoga, N. Y., Aug. 16. His disease was general debility, probably superinduced by enlargement of the liver, from which he suffered for many years. He was 53 years old, and had been continuously with this road since 1855, when he was given a position as bill clerk on the old Hudson River road. He was Auditor from 1864 to 1872, when he became Secretary to Commodore Vanderbilt, remaining in that position until 1877, when he was appointed Auditor of the New York Central & Hudson River road. In May, 1883, he was appointed Comptroller. Mr. Chambers was private secretary to William H. Vanderbilt from 1864 to 1883.

ELECTIONS AND APPOINTMENTS.

Alexandria & Northwestern.—This Texas company has organized by electing the following officers: R. B. Hubbard, President; Jas. Douglas, First Vice-President; A. Wettermark, Second Vice-President; E. C. Williams, Treasurer; John T. Bonner, Secretary.

American Midland.—R. L. Ettinger has been appointed Superintendent of Motive Power, with headquarters in New York.

Aspen-Ashcroft.—The directors of this Colorado line are: Ira W. Pendleton, L. M. Babcock, J. T. Cornforth, E. S. Kassler, John Dougherty, F. Sanford Betts and D. J. Hutchinson.

Atlanta & Florida.—At the annual meeting in Atlanta, Aug. 14, the following were elected directors: L. J. Hill, E. W. Marsh, J. W. Rucker, W. A. Russell, E. P. Howell, J. K. Brunner, P. L. Mynatt, H. C. Harris, L. F. Blalock, John Collier, S. B. Hoyt, R. F. Maddox, James R. Wylie. P. L. Mynatt, John Collier and James R. Wylie are the new members. The resignation of President Aaron Haas, which was tendered two months ago, was accepted.

Atlanta & West Point.—At the annual meeting in Atlanta recently the following board of directors was elected: Jno. Green, C. H. Phinizy, of Augusta; D. N. Speer, of Atlanta; Jacob Phinizy, of Athens; W. W. Berry, of Newnan; P. Calhoun, of Atlanta; E. P. Alexander, of Savannah. The board of directors organized by electing Col. C. H. Phinizy, of Augusta, President; Cecil Gabbett, General Manager, and H. M. Abbett, Treasurer.

Baltimore & Ohio.—The jurisdiction of E. W. Grieves, Master Car-Builder of the lines east of the Ohio River, has been extended over the entire system.

Buctouche & Moncton.—At the annual meeting held at Buctouche, N. B, last week, the old directors were re-elected. Dr. De Bertram was re-elected President.

Carolina, Knoxville & Western.—At the annual election in Knoxville, Tenn., Aug. 14, the following were elected directors: J. B. Humbert, W. W. Stringfield, F. A. Conner, J. A. Hoyte, E. C Luckey, J. P. Phillips, W. J. Reedy, S. J. McKinney, T. N. Cooper, W. J. Ellis, J. W. McCullough, W. T. Jones and A. A. Howell. The directors re-elected the old officers. They are: J. B. Humbert, of Princeton, S. C., President; S. J. McKinney, of Knoxville, Vice-President, and T. N. Cooper, of North Carolina, also Vice-President; Capt. A. D. Byrd, of Greenville, S. C., Secretary and Treasurer.

Chattanooga, Rome & Columbus.—The office of George Skinner, Superintendent, is at Rome, Ga., instead of at Chattanooga, Tenn., as was stated on page 532. The heads of all departments report to the Superintendent, except the Treasurers' Accountant and Traffic departments, which report to the President

Chesapeake & Ohio.—F. A. Givin has been appointed Master Mechanic of the Richmond & James River division with headquarters at Richmond, to succeed W. Hassman, transferred to the Huntington & Cincinnati division.

Chicago, St. Paul & Kansas City.—Frank Hoppe has been appointed Freight Claim Agent, with headquarters in the Phœnix Building, Chicago.

Duluth, Crookston & Northern.—The officers of this Minnesota company are: R. S. Montague, President, Crookston, Minn.; V. D. Simar, Superintendent of Construction, Fertile, Minn., and E. W. Lewis, Chief Engineer, Fertile, Minn.

Georgia Pacific.—The offices of Auditor and Treasurer of the road will be removed from Birmingham, Ala., to Washington, D. C., Oct. 1 next.

Houston & Texas Central.—W. L. Bisbee, Chief Train Dispatcher, has been appointed Superintendent of Telegraph, with office at Houston, Tex., in addition to his present duties.

Iowa Central.—A. D. Dwelle has been appointed Assistant General Passenger Agent in charge of the passenger department of the company. His office will be at Marshalltown, Ia.

Jacksonville Southeastern.—E. L. Tompkins has been appointed Trainmaster of the line, in place of E. D. Dresser, resigned.

Kentucky Union.—At the annual meeting of the Kentucky Union stockholders, held at Louisville, Ky., Aug. 16, the following officers were elected: Frank D. Carley, President; H. C. McDowell, Vice-President; Alex. P. Humphrey, Counsel; George Dole Wadley, General Manager.

Lackawanna & Southwestern.—Charles H. Hammond has been appointed General Freight and Passenger Agent, with office at Angelica, N. Y.

Louisville & Nashville.—Joseph A. Steltenkamp has been appointed Traveling Advertising Agent.

Missouri Pacific.—It has been decided to consolidate the offices in Little Rock, Ark., of Assistant General Freight Agent of the Valley Route and that of Division Freight Agent. The Division Freight Agent has had charge of all freight business on all the roads and branches of the Missouri Pacific system in Arkansas, except that of the Valley Route, which is now placed under his supervision. The Assistant General Freight Agent of the Valley road has also been Assistant General Passenger Agent of the Missouri Pacific, but the duties of the position will hereafter be attended to by the General Passenger Agent, at St. Louis.

J. A. Woolson has been appointed Commercial Freight Agent at Memphis. The office of Assistant General Freight Agent at Little Rock has been abolished. The territory of Division Freight Agent A. Bragg has been extended to the Little Rock & Fort Smith and the Little Rock, Mississippi River & Texas Divisions.

Montana & Wyoming.—Elijah Smith, Prosper W. Smith, John S. Tilney, E. R. Bell and Edward J. Berwind, of New York, and A. G. Harley, P. M. Gallagher and O. F. Goddard, of Montana, have filed articles for the incorporation of this company in Montana.

Nashville Northern.—L. T. Rhea, Lewis T. Baxter, R. G. Throne, John G. Houston, Major E. C. Lewis, Ed Richardson, J. M. Woodard, J. M. Williams, Fred T. Cummins, Harvey Neal, H H. Posson, H. W. Buttorff, Thos. Gibson and A. J. Harris are the incorporators of this new Tennessee company.

Nashville & West Nashville.—M. S. Cockrill has been chosen President and General Manager, to succeed L. H. Davis, resigned.

Omaha, Kingman & El Paso.—Incorporated in Kansas by the following, who are also directors: G. A. Walkop, Hutchinson, Kan.; Geo. L. Rhodes, Chicago; R. M Daniels, Boston; J. D Humphreys and William Wallace, Kingman, and A. L. Williams, Topeka.

Oneida, Oneonta & New York.—J. W. Warner, R. B. Downing, E. E. Coon, E F. Haskell, W. F. Randall, Oneida, N. Y., M. F. Smith, Knoxboro, N. Y., Geo. B. Kimball, New Berlin, N. Y., James P. Kenyon, John A. Ward, Morris, N. Y., Albert Morris, M. L Keyes, Burr Mattice, W. A E. Tompkins, Oneonta, N. Y., are the directors for the first year of this New York company.

Portland & Puget Sound.—Chester W. Collins, John D. Kilpatrick, W. H. Kilpatrick, John H. Smith, E. T. Johnson, Lee Hoffman and Emil Adler have incorporated this company in Oregon.

Portsmouth & Dover.—At the annual meeting of stockholders held Aug. 14, the following directors were chosen: Frank Jones, Daniel Marcy, Joseph A. Walker, Edmund S. Fay, of Portsmouth; Joseph D. Guppy, Frank A. Christie, Benjamin F. Neally, of Dover. At a subsequent meeting of the directors Frank Jones was chosen President; George L. Treadwell, Treasurer, and Calvin Page, Clerk.

Southern Kansas of Texas.—A circular signed by Wm. B. Strong, President, has been issued announcing that Chas. B. Strohm has been chosen Vice-President and General Superintendent, vice J. J. Mullane and H. R. Irvine, respectively, who have resigned those positions; J. C. Paul was chosen Secretary and Treasurer, vice J. J. Mullane, resigned, and J. A. Ostrander, General Freight and Passenger Agent, vice H. R. Irvine, resigned, in addition to his duties as Auditor. The headquarters will be at Panhandle, Texas.

Tacoma, Olympia & Pacific.—The incorporators of this Washington company are: Frederick D. Heustis, Nicholas H Owings, William H. Calkins, Anthony M. Cannon and Harry A. Clark.

Tuskaloosa Belt.—The company has organized by electing the following directors: W. C. Jemison, B. Friedman, W. G. Cochrane, George A. Searcy, Thos B. Allen, George P. Aynes and W. C. Fitts. The directors have elected W. C. Jemison, President; T. B. Allen, Vice-President; Geo. P. Aynes, Superintendent and Secretary, with office in Tuskaloosa, Ala.

Union Terminal.—George Sandrock, George S. Potter, George Macnoe, David Bell, Jacob Messert, Jr., Philos G. Cook, Jr., Edward S. Hawley, Seldon S. Brown, Josephus N. Larned, David S. Bennett, Robert M. Cannon, George H. Dunbar, Edward S. Cook, all of Buffalo, N. Y., are the directors of this company, just chartered in New York.

Wyoming, Salt Lake & California.—L. Sproat has been elected Secretary, in place of Theodore Brough, resigned. Mr. Brough still remains a Director.

Zanesville & Ohio River.—The following new directors were elected at a meeting in Zanesville, O., Aug. 16: E. M. Stanberry, McConnelsville; T. W. Moore, Harmar; James Buckingham, A. W. Train, E. C. Winstanley, John Hope, W. A. Graham, Zanesville; E. E. Denmister, Philadelphia; H. B. Hollins, August Belmont, Jr., R. N. Young, New York; Needless, Philadelphia. C. M. Wicker, of New York, was elected President.

OLD AND NEW ROADS.

Albemarle & Pantego.—This North Carolina road is now completed for a distance of 16 miles, and on the remaining 14 miles, between Mackeys Ferry and the Pantego River a force of 200 men is working, and will have the road opened for traffic Jan. 1 next. There will be a nine-mile transfer from Mackeys Ferry, the northern terminus, across Albemarle Sound to connect with the Norfolk Southern at Edenton, N. C., its southern terminus. The road is being built by the John L. Roper Lumber Co., of Roper, N. C. George W. Roper is Superintendent and H. T. Greenleaf is Chief Engineer.

Alexandria & Northwestern.—Charter filed in Texas to build a road from a point on the Sabine River in Sabine County, northwest through the counties of Sabine, San Augustine, Shelby, Nacogdoches, Panola, Rusk, Smith, Van Zandt, Kaufman, Rockwall, Dallas, Collin, Cooke and Wise counties to a point on the Fort Worth & Denver City road in Wise County. The capital stock is $300,000

Arkansas & Louisiana.—This road extending from Nashville to Hope, Ark., 27 miles, and which has been in the receiver's control since December, 1887, is to be surrendered to the company Aug. 26, and the receiver discharged.

Arkansas Midland.—Suit has been begun in the Federal Court at Little Rock, Ark., against this road to test the legality of the aid bonds received by the road from the State some years ago. The United States Supreme Court has decided that payment of these bonds could not be enforced against the roads which received them, for the reason that there was nothing on the face of the bonds to bind the railroad for their payment. These bonds, however, are specially guaranteed, and on this point the suit is based. The amount involved is $1,350,000.

Aspen-Ashcroft.—Incorporated in Colorado to build a road from Aspen to Tourtelotte Park, Richmond Hill and Ashcroft; also, a branch northeasterly via Hunter Park. The road will be about 13 miles long, and will be an outlet for the ore from Tourtelotte Park. The capital stock is $500,000. It was incorporated last July as the Pitkin County Railroad.

Belleville, Centralia & Eastern.—About 300 men are now working on the line near Mt. Vernon, Ill. The company has been unable to obtain right of way through Belleville, Ill., upon satisfactory conditions, and the engineers have been instructed to survey a new route, passing about two miles west of Belleville, to Ward's Station on the Illinois & St. Louis Division.

Birmingham Mineral.—It is stated that the locating surveys are being made to extend the road to Tuscaloosa, Ala., and that the contracts for grading will soon be let. The road is now completed from Birmingham southwest for more than one-half the distance to Tuscaloosa.

Brantford, Waterloo & Lake Erie.—Tracklaying will soon be completed on the section between Brantford and Waterford, Ont., 17 miles. The grading was finished some time ago. It has not yet been decided when the grading on the extension to Hamilton, Ont., will begin, but the company confidently expects that all the necessary arrangements for the extension will soon be made, so that work can commence at an early date. The reconnaissance has been finished to Hamilton, and the Chief Engineer, H. K. Wickstead, of Brantford, Ont., is now organizing a surveying party for the section between Hamilton and Toronto.

Brazos & Northern.—The final location for this road has been completed, the route adopted being from the mouth of the Brazos River at Velasco, Tex., north, about 37 miles, to Arcola, at the junction of the International & Great Northern and Gulf, Colorado & Santa Fe roads. Arcola is 18 miles southwest of Houston. It is expected that grading will commence at Arcola next month. The grading will be light.

Burlington & Missouri River.—An official circular has been issued announcing that the Denver, Utah & Pacific has been consolidated with the Burlington & Missouri River, and that on and after Sept. 1 it will be known as the Colorado Division.

Canadian Pacific.—Work has been started on the Souris branch of the Canadian Pacific, and will be pushed forward with all possible haste to Plum Creek this fall. Grading was commenced at Kemnay, eight mile sfrom Brandon, Man., where the branch will connect with the main line, Egan Bros. have the contract for grading from Brandon to Plum Creek.

The company has purchased the Coburg & Rice Lake road, and will continue it easterly, along the south shore of Rice Lake to the commencement of the River Trent, when it will cross the river, and connect with the Canadian Pacific at Norwood, Ont. A line will also be built from Coburg, Ont., westerly, touching at Port Hope, Newcastle, Bowmanville, Oshawa and Whitby, and connect again with the Canadian Pacific at Agincourt, Ont., and running throughout in connection with the Grand Trunk.

Tracklaying on the Southwestern extension of the company from Barnsley to Carman, Man., was completed last week.

Judgment was rendered at Cobourg, Ont., recently by Chief Justice Armour, in the suit of Coumee & McLennan against the Canadian Pacific, securing to the plaintiffs an award of $251,700. The case has been pending several years, being the outcome of a contract which the plaintiffs had with the company for the construction of a portion of the line north of Lake Superior. The case, it is understood, will be carried to the Court of Appeals.

Canada & St. Louis.—The road, extending from Goshen Ind., to Sturgis, Mich., 29 miles, was sold at Goshen, Aug. 17, by a Commissioner's sale. The property was bought in for a syndicate of Chicago capitalists by Henry A. Gardner, of that city, for $225,000. It is stated that the line will soon be extended from Goshen southwest to La Crosse, Ind., about 55 miles.

Carolina, Knoxville & Greenville.—The annual meeting was held in Knoxville, Tenn., Aug. 14, and it was stated that the company has 105 miles of road graded from Augusta, Ga., north to Greenville, S. C. There are also 20 miles graded north from Greenville toward Knoxville. This brings the road to the foot of the mountains on the south side. Fourteen miles of the 20 west of Greenville have the track down. The heavy and expensive part of the work remains to be done; the grading across the mountains from the foot on south side to the foot on the north. On this section there is one long tunnel to be made. It is all through a mountainous and rough country. The officers hope to be soon able to recommence work. The road is now in the Receiver's hands.

Central Counties.—The shareholders will hold a special meeting at Ottawa, Can., Sept. 10, to authorize the directors to issue bonds and to execute a mortgage upon the franchises and property of the company securing payment of the bonds.

Central of Georgia.—A locating survey is now being made by Capt. C T. Dabney for a proposed extension of the Columbus & Rome road from Greeneville, north to Newnan, Ga., about 25 miles. The Columbus & Rome is to be made standard gauge from Columbus to Greeneville, 50 miles. Of the bonds of the Savannah & Western recently placed, there were $300,000 reserved to change the gauge of the road from standard, and to extend it from Greenville to Newnan.

Central Vermont.—The survey will soon be completed for a proposed branch from Waterbury northeast to Stowe, Vt., above 10 miles.

Central (New Brunswick).—The work of taking down and rebuilding nine bridges on the St. Martins & Upham road, now operated as the Southern division of this line, commenced last week. The road is to be entirely reballasted and laid with steel rails, the cuts widened for snow ploughs, and the line placed in a thoroughly efficient condition. Surveys will be commenced next month on the proposed branch from Barnesville to St. John, the construction of which will give the road direct connection for the West with the New Brunswick road.

Central of New Jersey.—The South Easton & Phillipsburg, whose incorporation was recently noted, is to be built in the interest of this company, and is intended to make a direct connection between the Central of New Jersey and the Belvidere Delaware Railroad, operated under lease by the Pennsylvania, by a bridge and the approaches thereto, leading from the tracks of the former at Easton, Pa., to the tracks of the latter at Belvidere, N. J. The work is under contract, and will be pushed to completion.

Chattanooga, Rome & Columbus.—A subscription of $25,000 has been raised in Columbus, Ga., to secure an extension of the Chattanooga, Rome & Columbus road from Carrollton, Ga., south about 55 miles to Warm Springs or some other point on the Georgia Midland & Gulf, and thence over that road to Columbus, through trains being run from Chattanooga to Columbus.

Chicago & Northwestern.—Kimbalt & McNamara, of Sioux City, Ia., have secured the contract for building the Junction Railroad from Montrose to North Evanston, in Cook County, Ill., a distance of 7$\frac{1}{10}$ miles. The line is to connect the Chicago & Milwaukee and the Minnesota & Central Dakota lines of the road. The firm has also secured a contract for work on the line at Appleton, Wis.

Cincinnati, Alabama & Atlantic.—Ground was broken, Aug. 17, at Huntsville, Ala., for this road, which is to run from Huntsville southwest to Tullahoma, Tenn., and thence to Somerset, Ky., to which point the surveys are now being made from Tullahoma.

Cincinnati, Washington & Baltimore.—The foreclosure sale of the road, which was set for Aug. 19, has been postponed 30 days, on account of some delay in the arrangements for carrying out the plans of the interested parties.

Cleveland, St. Louis & Kansas City.—S. Dwight Eaton recently sued the company for $30,000 balance claimed to be due him for construction work performed in St. Charles County. Last week Z. Sharp, a sub-contractor under Mr. Eaton, commenced suit in St. Louis for $29,225 which he alleges is still due him for work done. He names as defendants the Cleveland, St. Louis and Kansas City railroad; the Farmers' Loan & Trust Co.; the Holland Trust Co., all of New York, and S. Dwight Eaton.

Denver & Rio Grande.—The company is said to have definitely decided upon the new route from Denver to Leadville, Colo., by which the distance will be greatly lessened, probably by 100 miles, and the time reduced to six hours. The new line will be standard gauge and, it is said, will follow the South Platte River from Denver for more than half the distance, and then continue southwest and join the old line at Salida, and thence north to Leadville.

The Lake City branch from Sapinero south, 36 miles, to Lake City, Col., which was finished early in July, was opened for traffic last week.

Duluth, Crookston & Northern.—The contract for grading from Crookston, on the St. Paul, Minneapolis & Manitoba, southeast to Fertile, Polk County, Minn., on the Northern Pacific, about 23 miles has been let. Grading will soon commence, the location having been completed.

East & West of Albama.—It is stated that the road will be extended from Cartersville through Gainesville to

Athens, Ga., if the latter town will raise $25,000, to meet part of the expense of building the extension.

Florence Northern.—Tracklaying will soon commence on the first five miles north from Florence, Ala.

Georgia.—Bills incorporating the following companies are before the Georgia Legislature: Eatonton & Machen; Brunswick, Athens & Northwestern, capital stock, $2,500,000; Dalton & Stephenson; Augusta & West Florida; Dahlonega & Dawsonville; Albany & Cordele, and the Artesian City; bills continuing the charter of the Augusta & Somerville and amending that of the Empire & Dublin are also under consideration.

Georgia.—The company is said to have under consideration the advisability of extending its road from Athens, northwesterly to Jefferson, Ga., and thence running over the Gainesville, Jefferson & Southern road to Gainesville, and then building from that point westerly through Kingston to Rome, Ga.

Grant's Pass & Coast.—This company has filed a charter in Oregon to build a road from Grant's Pass to the southern boundary of Oregon. The capital stock is $1,000,000, and the principal office is at Grant's Pass. The incorporators are: J. T. Flynn, Harry Young, Arthur Conklin and others.

Gulf & Chicago.—A deed of trust to the Metropolitan Trust Co., of New York, for $9 375,000, has been filed in the Probate Court by C. C. Merrick, President, and W. S. Lewis, Secretary of the company.

Hot Springs.—It is expected to have this road, extending from Malvern to Hot Springs, Ark., 25 miles, changed to standard gauge by Oct. 1. The standard gauge ties have been put in, and only the rails need to be changed to complete the work.

Indiana & Lake Michigan.—Construction is in progress between South Bend, Ind., and St. Joseph, Mich., and it is claimed that the road will be ready for operation Dec. 1 next. It is stated that the Vandalia line will operate the road when it is completed as an extension of the Terre Haute & Logansport road.

Jewett City & Westerly.—The two routes surveyed for this proposed road show that for three miles, in New London County, Conn., there will be grades of nearly 100 ft. to the mile at Pendleton Hill. A third route, following the Ashoag River Valley, will be surveyed, to avoid the hill.

Kansas City & Beatrice.—Kilpatrick Bros. & Collins, of Beatrice, Neb., have been awarded the contract for building this extension of the Kansas City, Wyandotte & Northwestern road from Summerfield, Kan., to Virginia, Neb., on the Chicago, Rock Island & Pacific, 14 miles east of Beatrice. Trains will run from Virginia to Beatrice over the Chicago, Rock Island & Pacific tracks.

Keeseville, Ausable Chasm & Lake Champlain.—R. H. Rogers, of Plattsburg, N. Y., has been awarded the contract for grading this road from Port Kent to Keeseville, N. Y., 5½ miles. E. K. Barber, of Keeseville, is President.

Kentucky Midland.—This company recently purchased a strip of land near Paris, Ky., by which it secures the entire right of way from Georgetown, east to Paris. A large force is at work on this section and will soon have it completed. The road has been finished from Frankfort to Georgetown.

Kentucky Union.—The extension of this road to Jackson, Ky., is rapidly approaching completion. Trains are now running from Winchester to Orlando, Ky. Before the close of the year the road will be completed, and a direct line will be established between the Three Forks of the Kentucky River and Lexington.

Kingston, Smith's Falls & Ottawa.—The provisional directors of this company are endeavoring to raise the necessary capital to build their road. At the last session of the Dominion Parliament a subsidy of $3,200 per mile, not exceeding in the whole $64,000, was voted to assist in the construction of the road. There appears to have been some difficulty regarding the bonuses voted by the several municipalities through which the line is to pass, which, however, the chairman of the provisional directors, C. F. Gildersleeve, says has been adjusted.

Lansing & Northwestern.—The contracts for the first division from Lansing, Mich., north to Maple Rapids, about 30 miles, will be let Oct. 1 instead of Sept. 1, as announced. The company claims to have secured sufficient money to build this first division. The final location is finished to Maple Rapids, but beyond that only preliminary surveys have been made. The contemplated route is as follows: Beginning at Lansing, thence through De Witt, St. Johns, Maple Rapids, Carson, Elm Hall, Riverdale, Dashville, Chippewa Lake, Kalkoska and Charlevoix. The right of way has not yet all been secured, but doubtless soon will be. Quincy A. Thomas, Oxford, Mich., is Secretary and Chief Engineer.

Lime Rock.—Work is nearly completed on this road, which runs completely around Rockland, Me., making a perfect belt. Work was commenced on the road in July, 1888, and it was built by Parker Spofford and James Mitchell. Nearly 1¾ miles of trestle work is completed and seven of surface road, making nearly 9 miles in all. Nearly 1,500,000 ft. of hard pine timber has been used in building the road. The road supplies about 50 kilns with limestone and kiln wood. At some places the trestle work is 70 ft. high.

Los Angeles, Glendale & Pasadena.—Grant Bros., of Los Angeles, have been awarded the contract for building this road from Los Angeles to Pasadena, Cal., about eight miles.

Louisville & Nashville.—Winston Bros., of Minneapolis, have the grading for the double track between South Nashville and Shepardsville, Tenn., 16 miles, completed to within a few miles of the latter town. The firm has large forces at work on the other sections, for which it has the contracts for double tracking.

On the Cumberland Gap extension track is laid to Yellow Creek, a point between Pineville and Middleborough, Ky. Trains will soon be running from Louisville through the Cumberland Gap tunnel.

Louisville, New Orleans & Texas.—The first through train over the Woodville branch from Slaughter, La., on the main line, west to Bayou Sara, over the newly completed line, and thence north over the old West Feliciana road to Woodville, La., reached the latter place Aug. 12.

Louisville Southern.—The company is doing everything to expedite construction on the Lawrenceburg and Lexington extension. The company was voted $100,000 by Lexington if it had trains running between that town and the Anderson County line by Aug. 29. Some of the taxpayers asked for an injunction to prevent the issuing of the bonds, but this was not granted by the lower court and the suit was taken to the Court of Appeals, which has not yet rendered a decision. The tracklaying is finished from Lexington to the Kentucky River, where a large bridge is being erected. The bridge has just been finished, and the company will probably be able to run a train from Lawrenceburg to Lexington, 24 miles, by Aug. 29.

Macon & Birmingham.—The company has placed a second corps of engineers in the field on the locating survey. The first party has finished over 40 miles from Macon, Ga. The preliminary survey has been completed. The company had intended to let contracts for grading by this time, but it has decided to wait until action has been taken by the Georgia Legislature on the bills now before it, to amend this company's charter and to permit the Georgia, Southern & Florida to guarantee its bonds. It is expected that the result will be known early in September. The company claims to have already secured enough funds to construct the road in the most substantial manner. It proposes to use 75-lb. rails, and will have 5 degree curves and a maximum gradient of 50 ft. No road has heretofore built through the mountains between Macon, Ga., and Birmingham, Ala., with less than 66-ft. grades. Mr. W. Henry Wells, of Macon, is Chief Engineer.

Manistee & Northeastern.—The company has laid nine miles of track in Michigan on its road this year, and now has under contract 20 miles to the north line of section 16, township 26, north.

McKeesport & Belle Vernon.—A large force is at work on the five miles yet to be built to reach Belle Vernon, Pa., and the line will probably be completed to that point by Sept. 15.

Missouri Pacific.—It is stated that the company has commmenced clearing for a proposed extension from Tripp, Ark., at the junction of the Warren Branch and the Little Rock, Mississippi River & Western main line to Vidalia, La. This branch will be 85 miles in length.

Montana Central.—The reports were revived this week that the company would soon commence work on the proposed extension from near Butte City, westerly to the smelting works at Anaconda. The route has been surveyed, but whether the line is built will depend a great deal upon the action taken by other companies in the matter.

It is also stated that arrangements have been made by which this road will be more directly managed by the St. Paul, Minneapolis & Manitoba, and that a formal consolidation may even be made.

Montana & Wyoming.—This road has been chartered in Montana to build from Billings, Mont., west to the Yellowstone River, near the mouth of Clark's Fork, thence along the latter, through the Crow Reservation to the boundary line between Montana and Wyoming, thence still following the river into Wyoming and to a point on the boundary line near Index Peak, and thence to Cooke City. Also a branch line up Bear Creek about 8 miles long, to the Park County coal mines. The capital stock is $2,000,000. This is the same route as that over which the proposed Billings, Clark's Fork & Cooke City intended to build.

Napanee, Tamworth & Quebec.—Work has been stopped on the extension from Tamworth to Tweed, Ont., 18 miles, the laborers refusing to work until they receive their wages, which have not been paid for some time. Bailiffs are trying to find the contractors, who have not been on the extension for some time. The Dominion Government has granted the railroad company several subsidies for the construction of a road over this route. In 1886 the company was voted a subsidy of $70,000 for the line, and in 1887 a further subsidy of $12,800 was authorized. The contract was awarded July 31, 1888, the line to be completed in two years.

Nashville Northern.—Chartered in Tennessee to build a road from Nashville, northerly to the Kentucky state line, to connect there with the proposed extension of the Ohio Valley road, south from Princeton via Hopkinsville, Ky., to Clarksville, Tenn., and Nashville, thus forming a through line from Evansville, Ind., to Nashville.

Nebraska & Western.—E. P. Reynolds & Co. have completed the grading from South Sioux City to Plainview, Neb., 82 miles. Tracklaying has not yet been commenced owing to the non-arrival of the rails. When these are received it is stated that two miles of track will be laid each day until it is completed to Plainview.

New Roads.—Subscriptions are being received to the capital stock of a company which is soon to be chartered to build a proposed road in Berks County, Pa., from Reading, via Stony Creek and Friedensburg, to Bowerstown. Lewis Kramer, of Stony Creek, is the prime mover in the enterprise.

A survey is being made under G. M. Willis, Chief Engineer, for a new road to extend from Iron Mountain, Mich., on the Milwaukee & Northern east, through Norway, Vulcan and Waucedah to new ore docks at Escanaba, Mich., about 100 miles from Iron Mountain. The line, if built as proposed, would pass through the Menominee iron range and parallel to the Chicago & Northwestern the entire distance.

New Westminster & Southern.—About 500 men are working on this road between New Westminster, B. C., and the international boundary, and about 700 men are at work in the United States on the line that is being built north to connect with it by Bennett, Larabee & Co., of Portland, Ore. When completed the distance by rail from Portland to New Westminster will be 350 miles. It is claimed that the road will be ready to receive traffic by July, 1891.

Northern Pacific.—The Board of Directors this week unanimously passed a resolution to submit the financial plan devised by Henry Villard, as Chairman of the Finance Committee, to a vote of the preferred stockholders. The salient points of Mr. Villard's plan are a consolidated mortgage of $160,000,000, which is to be used for the retirement of the outstanding first, second and third mortgage bonds and other securities guaranteed by the Northern Pacific. It is not intended to issue at present more than $15,000,000 of the consolidated mortgage bonds, which will be used to provide for indispensable improvements, the enlargement of terminal facilities, permanent betterments and improvements on the main line. The general features of the scheme for the disposition of the new consolidated bonds are: reservation of about $120,000,000 for future refunding transactions; reservation of $25,000,000 for future needs in building branch lines, and early application of $15,000,000 for the pressing needs of the company. These latter include the cancellation of $10,000,000 bonds of the Oregon & Transcontinental Co., for which the Northern Pacific is virtually liable.

Northern Pacific & Manitoba.—During the month of July this company paid out in Manitoba $200,000 for construction and other expenses in connection with its work. The company also paid the Manitoba government $900,000 for the Red River & Portage La Prairie roads.

Northern & Western.—At a recent meeting of the directors of this company preliminaries for the amalgamation of the Chatham Branch with the Northern & Western were completed. This extension gives the Northern & Western a continuous line of 127 miles and a deep water terminus on the Gulf of St. Lawrence, at Chatham, New Brunswick.

Oconto & Southwestern.—McIntosh Bros. & Co. have the contract for building this recently incorporated line from Oconto, Wis., southwest to Abrams or Stiles on the Milwaukee & Northern, the distance being about 14 miles. O. A. Ellis, of Oconto, is President.

Ohio & Big Sandy.—Geo. C. Wood, Samuel Davis, J. Collins and Anson Maltby, who purchased the Chattaroi road at foreclosure sale, have incorporated this company, with a capital stock of $2,000,000, to operate the line.

Oneida, Oneonta & New York.—Articles of incorporation have been filed in New York. The company proposes to construct a road from the village of Oneida, Madison County, southeasterly through the counties of Madison, Oneida, Chenango and Otsego, to Oneonta. The length of the proposed road is about 65 miles. The capital stock is to be $650,000.

Oregon & Washington Territory.—On the Waitsburg extension seven miles of track has been laid from Walla Walla, and the grading is finished for some distance further.

Oshawa.—The town of Oshawa, Ont., has voted a bonus of $15,000 towards assisting in the construction of this road. The Dominion parliament has also voted a subsidy of $3,200 per mile, to be paid as work progresses. Operations will be commenced at once. The road will be completed by spring.

Ottawa & Gatineau Valley.—Work was commenced upon this line last week between Ironside and Chelsea, Que., by 100 men, with John Ryan, of Quebec, as Superintendent of Construction. On the first ten miles there is heavy work in some parts. It is not intended to complete more than ten miles of road this year. In addition to a large land subsidy which the company is to receive from the Province of Quebec in the valuable phosphate area through which the road passes, the Dominion Parliament has voted $320,000 towards its construction. To fulfill the terms of the contracts under which the road is to receive the subsidies, ten miles of the road must be completed by Jan. 1, 1890.

Pacific.—This company has been chartered under the laws of Colorado to build a narrow-gauge road from San Francisco to Santa Cruz, Cal., along the coast to open up extensive timber lands.

Philadelphia & Reading.—The company having failed to secure the passage of a satisfactory terminal bill through the Philadelphia councils, it has for some time past been at work on its property in the city excavating for foundations for its proposed elevated road, claiming that its charter gives it the right to build an elevated road to Market street. It declared its intention to build across Division street, and the city has filed a bill in equity in the Common Pleas Court reciting that the company contemplated building a road over and across streets, and asking for injunctions prohibiting the company from doing the work until after hearing, and perpetually thereafter. The main contention of the city will be that the Philadelphia & Columbia road (bought by the Philadelphia & Reading) located its terminus, in accordance with its charter, upon the west side of Broad street and possessed no authority to extend or continue its railroad by branching or otherwise across Broad street, and the Philadelphia & Reading never acquired such right by purchase or otherwise. The Philadelphia & Reading years ago moved its station across to the east side of Broad street, where it now is. The case will be heard in September, and in the meantime the company has agreed not to do any work on or across the streets.

The line of the Rupert & Bloomsburg, extending from Rupert to Bloomsburg, Pa., was opened for business Aug. 19. It will be operated as the Bloomsburg Branch of the Catawissa Division of this road.

Pitkin County.—This company, incorporated last July in Colorado to build a line 13 miles long, has been re-incorporated in the same state as the Aspen-Ashcroft Railroad Co.

Port Arthur, Duluth & Western.—James Conmee and G. H. Middleton have been awarded the contract for the construction of this road, and work will commence at once. The road is to extend from Port Arthur via Fort William, through the silver district of the Whitefish Valley, to the international boundary at Gunflint Lake, thence to connect with the Duluth & Iron Range, giving a direct land route from Port Arthur, Ont., to Duluth. Fifty miles of the road has been partially located, and the remaining 30 miles has been explored, and the general route and probable cost has been ascertained. Thirty miles of the road will be completed this fall, and probably 40 miles before Jan. 1. Work in getting out ties, timber, etc., and on bridges, will be carried on through the winter. The subsidy from the Dominion government is $3,200 per mile throughout, and from the Ontario government $3,000 per mile for 40 miles. The municipalities through which the road runs have also guaranteed bonuses amounting to $50,000. Thomas Marks, of Port Arthur, is President, and H. K. Urckstead, of Brantford, Ont., is Chief Engineer.

Portland & Puget Sound.—Incorporated in Oregon to build a road from Portland to Seattle, W. T., with several branches. One of the branches is to extend to Gray's Harbor and the other to Port Townsend, W. T. The capital stock is placed at $5,000,000.

Puget Sound & Gray's Harbor.—It is expected to have this road completed from Kamilche to Montesano, Wash. Ter., by Oct. 1. About 19 miles is now in operation from Kamilche to Summit. From Summit to Montesano, 17 miles distant, 12 miles of the road is graded and ready for tracklaying. A force of about 450 men and 60 teams is working on the road, which is being built by the Port Blakeley Mill Co.

Red River, Sabine & Western.—All the preliminary surveys on this road have now been completed from Alexandria, La., southwest to San Augustine, Tex., west to Nacogdoches, thence to Palestine to connect with the International & Great Northern, to Corsicana to connect with the St. Louis, Arkansas & Texas, and thence northwest to Fort Worth. Work is being rapidly pushed, and about 12 miles south from Alexandria has been graded.

Regina, Long Lake & Saskatchewan.—Bids are asked for grading the first 80 miles of this road, which is to be built from Regina, in Assiniboia, on the Canadian Pacific to Prince Albert, in Saskatchewan, 235 miles. James Ross, Windsor Hotel, Montreal, is the contractor for the whole line. A contract for 200,000 ties has been given to J.

McKenzie. Ground was broken last week, and it is expected to complete the line next year. An order for 10,000 tons of steel rails has been placed in England and 10,000 tons have also been bought in Montreal.

Richmond, Nicholasville, Irvine & Beattyville.—The trustees of this company have filed a mortgage in the Jessamine County (Ky.) Court to the Central Trust Co. of New York for $2,375,000. The money is to be used to complete the road, which has been graded from Nicholasville to Richmond, Ky., 22 miles. The contract has just been let for the section from Richmond to Beattyville, 57 miles.

Rio Grande Junction.—This company has just been organized, with a capital of $2,000,000, to build a line 64 miles long in the interest of the Denver & Rio Grande and the Colorado Midland companies. The line will extend from Rifle Creek to Grand Junction, Col., connecting there with the Rio Grande Western, and making a through line to Salt Lake City. The bonds of the new company, at the rate of about $23,000 per mile, will be guaranteed by the Denver & Rio Grande and the Colorado Midland.

Rome & Carthage.—The survey of the entire road has been finished, and the estimates and profiles completed. The road is to extend from Rome, N. Y., north to Carthage, about 70 miles. George Leighton is Chief Engineer.

Rome, Watertown & Ogdensburg.—Certificates of surrender of the capital stock of the Norwood & Montreal Railroad Co. to the Rome, Watertown & Ogdensburg, and of the Syracuse, Phœnix & Oswego Railroad to the same company, have been filed in the office of the Secretary of State, at Albany, N. Y. The Norwood & Montreal extends from Norwood to Massena Springs, N. Y., 13 miles, and the Syracuse, Phœnix & Oswego extends from Woodards to Fulton, N. Y., 17 miles. Both lines have been operated under lease by this company; the former since March, 1886, the rental being interest on bonds. The latter line was leased Sept 7 1885, and under the terms of the lease $175,000 of the $350,000 issued for construction were cancelled.

St. Louis & San Francisco.—Residents of West Plains, Howell County, Mo., have held a meeting and appointed a committee to invite this company's officers to extend the road from Salem south, a matter of about 65 miles, to West Plains, to give that town direct connection with St. Louis.

Salt Lake & Eastern.—It is expected to have most of the heavy grading on this road completed by Sept. 10. Grading is still in progress between Parley's Canon and Park City, Utah. Tracklaying has been commenced.

San Antonio & Arkansas Pass.—The application at San Antonio for the appointment of a receiver for the road, upon a disputed unadjudicated claim of $9,000, was denied on Aug. 17, the court holding that there was nothing in the condition of the company to warrant such proceeding. The company was prepared to meet all of its obligations in cash by payment or deposit money into the court.

Savannah, Americus & Montgomery.—This company and the Central of Georgia have entered into a traffic agreement by which this company will run its trains into Savannah, Ga., over the Savannah & Western extension of the Central of Georgia from Sterling, to which point this extension is under contract. The Central will also run its trains over the Savannah, Americus & Montgomery from Sterling to Americus. This latter road is now building a line from Abbeville east to the Oconee River, and proposed to build from that point into Savannah over a route parallel to one surveyed by the Central for the extension of its Savannah & Western division to Americus, which would parallel the Savannah, Americus & Montgomery.

Seattle, Lake Shore & Eastern.—Earle & McCloud, contractors on this road, recently instituted a suit at Seattle, W. T., for the appointment of a Receiver, alleging that the firm was unable to collect a claim of $87,000 due it for construction work, and that the company is insolvent. On these statements, W. H. Lidgerwood was appointed Receiver. Subsequently the company gave bonds in the sum of $90,000, and asked that the receivership be dissolved. This was done, and the case will come up for hearing at the next session of the court.

Seattle & Southern.—The surveyors of the road have nearly completed the location of their line from Seattle to Portland. All that remains to be done is to complete the line across Clarke County to Vancouver, W. T., on the Columbia River, and thence to East Portland and to a connection with the Southern Pacific in Portland, Ore. In general, the route parallels that of the Northern Pacific and Puget Sound shore, but it is direct, reducing the distance to Portland 37 miles. From West Seattle the survey runs south up the White River valley to the west of the Puget Sound Shore line. The Northern Pacific track is crossed once, near Puyallup. The rail distance between Seattle and Tacoma will be materially decreased. From Puyallup the survey runs southeast to the Columbia River.

Southern Pacific.—The three-mile branch of this road from Monterey to Pacific Grove, Cal., a watering place on Monterey Bay, was opened for traffic last week. The branch is being continued south from Pacific Grove. Turton & Knox, of Sacramento, are the contractors.

Staunton & West Augusta.—Keating Bros., of Pittsburgh, Pa., have secured the contract for building the road from Staunton, Va., northwest, 25 miles, to coal fields. Grading is to commence next month. R. N. Pool, of Staunton, is President.

Sydney & Louisburg.—A survey of this projected road is to be commenced at once. The Chief Government Engineer is now in Cape Breton making preliminary arrangements for the extension of the line from Sydney to Louisburg, C. B.

Temiscouata.—Mr. Davy, Engineer-in-Chief, has been examining the country between Edmundston and Moncton, New Brunswick, with a view to locating a line to run between these two points. It is reported that the Grand Trunk is interested in the projected line, in the expectation of securing a terminal point for its road on the Atlantic coast in Canadian territory.

Tennessee Midland.—The Virginia Construction Co., which is building this road, is to immediately put a large force on the 85 miles between Perryville and Nashville, Tenn., which yet remains to be built to complete the road from Memphis to Nashville. Trains now run to Perryville, on the Tennessee River, 135 miles from Memphis.

Terminal Union.—Articles of incorporation have been filed in New York for the purpose of constructing a road in the city of Buffalo, beginning at the intersection of Erie street with the tracks of the New York Central & Hudson River, and running thence, into and through Norton street, to and through Water street to the Commercial Slip, to connect with the wharves, docks and warehouses, extending along the Buffalo River, and also with tracks on the north side of Water street to connect with the New York Central & Hudson River. The capital stock is to be $100,000.

Texas Trunk.—The contract for supplying the road with 20,000 ties has been let to Smoot & Lang, of Dallas, Tex., and they will begin at once distributing the ties along the line of the road. As soon as the new ties are laid it is said that arrangements will be made for extending the road.

Tilton & Belmont.—The road was formally opened for traffic Aug. 17. It extends from Tilton to Belmont, N. H., four miles.

Toledo, Columbus & Cincinnati.—The company expects to let the contract about Sept. 1 for building the extension from the present southern terminus at a point six miles south of Findlay, Ohio, south about 20 miles to either Kenton, Ohio, or La Rue, on the Cleveland, Cincinnati, Chicago & St. Louis. Clifford Buxton is Chief Engineer of the company, and J. C. Williams is Chief Engineer in charge of construction south of Findlay.

The company has been offered free right of way for a branch line from Merrill to North Baltimore, O., and it is stated that the company has decided to build immediately.

Toledo, Findlay & Springfield.—The company has let a contract to B. F. Lawrence for grading 3½ miles of road from North Baltimore, O., toward Bowling Green. Work has been commenced, but it is anticipated that it will be stopped in a few days.

Union Pacific.—Mortgages on the rolling stock of the road, exceeding in the aggregate $600,000, have been filed in several counties in Nebraska. The mortgages are in favor of the American Loan & Trust Co., of New York, which became surety to the manufacturers for the rolling stock bought by the Union Pacific. The Peninsular Car Co., of Detroit, Mich., furnished $311,000 worth of the stock; the Michigan Car Co., of Detroit, $141,000; New York Locomotive Works, $36,000; Wells & French Co., Chicago, $4,000; Rhode Island Locomotive Works, Providence, $95,000; St. Charles Car Co., St. Charles, Mo., $68,000.

Union Transportation Co.—A charter has been secured for this company in Georgia by J. T. Howell, J. B. S. Holmes and others of Rome. The charter is very general, and provides for lines from a point at the junction of the Rome & Decatur and East Tennessee, Virginia & Georgia roads, one mile above Rome, Ga., to the lower part of the town. Also from Rome to some point on the North Carolina line, passing through the counties of Floyd, Bartow, Cherokee, Pickens, Gilmer, Union, Towns and Fannin.

United States & Canada.—This division of the Grand Trunk has been extended from Bombay to the town of Moira, Franklyn County, New York, 9 miles, and was opened last week. The line leaves the United States & Canada road, and connects at Moira with the Northern Adirondack and the Ogdensburg & Lake Champlain division of the Central Vermont. From Tupper's Lake onwards only 38 miles require to be built to insure a line that will reduce the distance from Montreal to Saratoga to 234 miles.

Upper Coos.—The road is now completed to Cookshire, Que., and is under construction to Dudswell Junction, which point it is expected to reach by Sept. 10.

Utica & Unadilla Valley.—The contract which J. A. Seno, of New York City, recently took to grade this road from Bridgewater to New Berlin, N. Y., 16 miles, has been declared forfeited by the Chief Engineer, D. E Culver. The contractor claims that he has been unable to go on with the grading only because the company has failed to obtain the right of way, and says he is prepared to put on a large force as soon as this is obtained. The company is to issue $250,000 five per cent. bonds, due in 30 years, secured by deeds of trust to Conrad N. Jordan, of New York City.

Vaudreuil & Prescott.—Charlebois & Foster, of Montreal, Que., and Doran & Herbert, of Valleyfield, Ont., have been awarded the contract for building this road, which is to extend from Vaudreuil Station, Que., connecting there with the Grand Trunk and Canadian Pacific roads to the city of Ottawa, and will be a very short line between that point and Montreal. Twenty miles of the line have been located, but parties will be put to work on the remainder very shortly. The road has received the usual government assistance and has also been voted considerable right of way and other local aid. The length of the line is 86 miles, of which 20 is to be built this fall. J. B. Mongenais, of Rigaud, is President, and J. M. Shanly, of Montreal, is Chief Engineer.

Wabash.—The company filed at St. Louis, this week, a first mortgage for $34,000,000 to the Central Trust Co. of New York, and a second mortgage of $30,000,000 to the Mercantile Trust Co of New York. The first mortgage covers real and personal property of the consolidated lines east and west of the Mississippi River. It is to secure the issue of 34,000,000 50-year five per cent. bonds, dated Nov. 1, 1887, and $11,741,000 of the issue will be used to pay the bonded indebtedness on the lines west of the Mississippi River, while the balance, $22,259,000, will be used to take the first-mortgage bonds on the lines east of the Mississippi, and a first lien on the lines west of the Mississippi, subject only to the prior liens now on the lines west of the Mississippi. The second mortgage is a lien on all the lines east and west of the river to secure $30,000,000 debenture bonds, to run from Feb. 1, 1888, and fall due in 50 years, drawing interest at the rate of five per cent. The issue is to be used in taking up the outstanding bonds of the roads. Both mortgages were filed in accordance with the consolidation and reorganization of the road. Most of the bonds of the road west of the Mississippi River have some time to run, but those of the road east of the river are due soon. The new mortgages and bonds merely take the place of the old mortgages and bonds.

West Virginia Central.—The first regular passenger train over the road from Cumberland, Md., to Elkins, W. Va., was run Aug. 16. Elkins is 25 miles southwest of Parsons, for some the end of the operated road.

Wyoming, Salt Lake & California.—Grading is making good progress from Park City north to Wanship, Summit County, Utah., on the Union Pacific, and it is expected that tracklaying will commence in the fall.

TRAFFIC.

Traffic Notes.

The Missouri Pacific has issued a notice that it will take cattle from Kansas City at carload rates without weighing.

It is announced that the Northern Pacific and Wisconsin Central will, on Aug. 25, begin running sleeping cars through between Chicago and the Pacific Coast.

The three roads running between Philadelphia (Camden) and the seashore resorts on the Atlantic coast hauled 844 passenger cars to the coast on Saturday last. At 35 passengers per car this would represent about 30,000 people.

The rates on pig-iron and on all articles of iron, which have recently been reduced on Central Traffic Association roads, will be restored Sept. 1 to the basis of 25 cents on car loads and 30 cents L. C. L. between Chicago and New York.

The Cleveland Weighing and Inspection Bureau in July increased weights 2,246 tons, being 18 per cent. above shippers' weights. Ninety per cent. of the freight weighed was in carloads, and the estimated saving was five times as much as the expenses of the bureau.

A large number of milling firms have sent a circular to all the Central Traffic Association roads complaining that corn is carried at 20 cents, while corn meal, hominy, grits, etc., are charged 25 cents. They complain that out of dozens of individual replies from traffic managers no adequate explanation can be found.

The Fitchburg road has announced that it will resume payment of passenger commissions. It complains that the decision of the question of differentials as between the New England roads does not receive prompt adjustment, as was promised by Commissioner Fink at the time the payment of commissions was discontinued.

The Central Traffic Association has passed resolutions protesting against the insertion in bills of lading for ocean shipments of clauses binding the shipper to submit disagreements to the laws of France and of Germany, respectively. The Compagnie Generale Transatlantique and the North German Lloyd steamship company have given notice that they will require such a clause.

A long dispute over the relation of the rate from Toledo to that from Chicago on anthracite coal to Missouri River points has been referred to General Traffic Manager Nathan Guilford, of the New York Central, for arbitration, and it is announced that a decision has been arrived at by which the rate after Sept. 24 will be: Toledo to Missouri River points, $3.70; Chicago to Missouri River points, $3.20; Mississipi River points to Missouri River points, $2.15.

It has just been discovered, for the first time in 23 years, or since the law was passed, that transportation in bond to and from points in the United States through Mexican territory is authorized by the general statutes in the same manner as for like transportation through Canadian territory. The Treasury department has several times refused to authorize the transit of merchandise across the southern border, but its attention having been called to the law, whose existence had not before been suspected, regulations governing traffic along the Mexican frontier will be prepared as in the case of Canada.

Secretary Rusk, of the Department of Agriculture, has sent to the principal cattle-carrying roads a circular referring to the necessity of using disinfected cars for cattle intended for export, in order to provide against the dissemination of Texas fever. At New York one yard, "accessible to all railroad companies," has been set apart exclusively for export cattle, and one of the trunk lines has already instructed its agents to furnish disinfected cars for such cattle. If the railroads do not take voluntary action the Secretary may be compelled to issue an order in the case, so that there may be no possible excuse for the exclusion of American cattle by any European country.

The following from the Kansas City *Times* is published as a list of *car-load* shipments made by the east-bound roads during the month of July. They are as follows:

	Cars.
Chicago, Burlington & Q	1,619
Chicago, Santa Fe & C	1,236
Chicago & Alton	1,180
Wabash	1,104
Chicago, Rock Island & P	866
Missouri Pacific	718
Chicago, Mil. & St. Paul	647

Another paper prints the following as the proportion of all traffic from Kansas City to Chicago from Oct. 1, 1888, to Aug. 1, 1889, ten months: Alton, 20.6 per cent.; Burlington, 20 per cent.; C., M. & St. Paul, 21.2; Rock Island, 8.5; Santa Fe, 23.1; Chicago, St. Paul & Kansas City, 0.4; Wabash, 5.8 per cent.

Northwestern Rates.

On Saturday last the Chicago, Burlington & Northern announced that on freight from the Atlantic seaboard, from points east of Buffalo, etc., and from Port Huron, Detroit, Toledo, Sandusky, Cleveland, Erie and Dunkirk, and on iron from Pennsylvania, the rates between Chicago and St. Paul, La Crosse and Winona would be 15, 12, 12, 10, 8, 7. The announcement was accompanied by a letter stating that the failure to induce the Central Traffic and Trunk line roads to pro-rate was the immediate cause of the action taken. A large diversion of traffic has taken place, and the road has suffered heavy loss. The rates do not apply to intermediate points. It is recounted that the Inter-state law really does not compel the observance of the fourth section under such circumstances as now surround the Northwestern roads. These roads have hitherto accepted all the disabilities and burdens of the act, but for some inscrutable reason have carefully refrained from availing themselves of the immunities which it grants. The prevalence of this view among Northwestern roads has been responsible for the promotion of many schemes to build short cut railroads to the national frontier which can get traffic out of the country in the quickest way.

The Chicago, St. Paul & Kansas City and the Wisconsin Central have followed the Burlington's reduction by similar action. The Chicago, Milwaukee & St Paul started to do likewise, but backed out. The Chicago Freight Bureau announces its intention to contest the legality of so great a difference between the local rate from Chicago to St. Paul, and the proportion of the through seaboard rate.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Aug. 17, amounted to 47,400 tons, against 53,524 tons during the preceding week, a decrease of 6,124 tons, and against 46,542 tons during the corresponding week of 1888, an increase of 858 tons. The proportions carried by each road were:

	W'k to Aug. 17.		W'k to Aug. 10.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	5,043	10.6	5,189	9.7
Wabash	2,188	4.6	2,776	5.2
Lake Shore & Michigan South.	9,615	20.3	9,446	17.7
Pitts., Ft. Wayne & Chicago	6,415	13.5	5,270	9.8
Chicago, St. Louis & Pitts	5,281	11.2	4,615	8.6
Baltimore & Ohio	3,490	7.4	2,807	5.2
Chicago & Grand Trunk	7,752	16.4	13,580	25.4
New York, Chic. & St. Louis	3,388	7.1	3,475	6.5
Chicago & Atlantic	4,228	8 9	6,366	11.9
Total	47,400	100.0	53,524	100.0

Of the above shipments 2,200 tons were flour, 11,862 tons grain, 1,590 tons millstuffs, 5,165 tons cured meats, 2,327 tons lard, 9,300 tons dressed beef, 1,985 tons butter, 2,364 tons hides, 436 tons wool, and 6,000 tons lumber. The three Vanderbilt lines together carried 38.0 per cent. of all the business, while the two Pennsylvania lines carried 24.7 per cent.